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IN APPRECIATION

With this issue of *The Alberta Journal of Educational Research* Dr. H. E. Smith retires as its Editor. Since 1957 Dr. Smith has assumed responsibility for editing this research journal which has now been in publication for ten years. During this time *The Alberta Journal of Educational Research* has become a well-established periodical reporting the results of studies on a wide variety of educational topics. At the same time the circulation of the journal has increased markedly. As Editor Dr. Smith has maintained high standards both with respect to substance and form. Dr. Smith brought to his work as Editor a rich background in education as a teacher, a teacher of teachers and a research scholar. From 1950-55 he was Dean of the Faculty of Education, University of Alberta. The Alberta Advisory Committee on Educational Research was fortunate to persuade him to become the Editor of its research journal in 1957. For his contribution to the success of *The Alberta Journal of Educational Research*, the Advisory Committee owes him a deep debt.

EDITORIAL

Since 1957 the circulation and status of this Journal have prospered under the competent editorial supervision of Dr. H. E. Smith. The new editor begins the task conscious of his inadequacies and aware of the possibility of mistakes, some of which may be all too evident in this issue. The only excuse offered is inexperience and the haste with which editing had to be done due to problems associated with the transition.

A change of editor may be taken to imply some change in editorial policy but as the details of this have not yet been finally decided only a general advance notice can be given in this issue. It is anticipated that while the Journal will continue to provide an avenue for the dissemination of knowledge derived from empirical research it will extend the range of material. The extension will be achieved by encouraging articles dealing with (1) theoretical aspects of research, (2) presentation and discussion of research designs and techniques, (3) explanatory statement relating to the financial support of research and (4) papers relating to the philosophy of research. Also, a conscious attempt will be made to encourage discussion and informed criticism of research reported in this and other journals. Briefly any research or research related manuscript is acceptable provided that it is substantial in content and clearly written in an appropriate style.

The editor would wish to have on hand a bank of manuscripts from which to select so that a consistent and comprehensive coverage can be maintained in each issue. Although this procedure may delay the publication of some manuscripts it is believed that it will enhance the status of the Journal and, consequently, of the contributors. Readers are requested to accept this brief statement (a more detailed one will be provided in the next issue) as an invitation to submit manuscripts that fit or are thought to fit any of the categories specified.

PSYCHOLOGICAL CONTRIBUTIONS TO EDUCATION: THE ORIGIN AND MODIFICATION OF VALUES

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The business of the psychologist in education is to present theoretical formulations about behavior, on the basis of which teaching decisions can be made concerning, among other things, the order of presentation of material and the handling of discipline problems. This psychologist is an irritating sort of fellow: he is not quite certain about how to explain behaviour (Skinner, 1953; Mischel, 1964); he has many theories, sometimes disconcertingly at variance with each other (compare, for example, Harper, Anderson, Christensen, and Hunka, 1964 with Travers, 1963); he never seems willing to accept the results of a crucial experiment which will at once validate one and invalidate another, and he views with some reserve Piaget, the nonpareil of contemporary educational theorists (Wohlwill, 1963). However, the present writer regards these as minor penalties to pay for the information the psychologist can offer about the behaviour of the pupil. Indeed the plethora of theories is an advantage to the nominalist: aware that any formulation is simply a representation of behaviour, the educator can choose the one most fruitful (least useless?) for his purposes.

Let us take advantage, then, of the relative rigour of the scientific approach to the definition, acquisition and alteration of values.

First, as to the definition: values are usually defined as conceptions of the desirable or, if behaviouristic terminology is preferred, the sorts of objects, conditions or events which are reinforcing to man either immediately or in the long run (Skinner, 1961, p. 576). The study of values is very important for at least three reasons: (1) they inform his behaviour (Galbraith, 1964, pp. 36-37) although this is surprisingly often untrue; (2) they are part of a conceptual framework which defines the individual (Harvey, Hunt, and Schroder, 1961, pp. 62-63) and gives him what Wheelis (1958) terms identity or

... a coherent sense of self. It depends upon the awareness that one's endeavors and one's life make sense. It depends also on stable values and upon the conviction that one's actions and values are harmoniously related. It is a sense of wholeness, of integration, of knowing what is right and what is wrong and of being able to choose. (1958, p. 19)

A third reason why values are important is that they may be subtly forced on certain groups in a community while being at odds with the legitimate and even necessary desires of members of these

groups. For example, Dollard (1949) points out that it is difficult to expect personal restraint now from the Negro when his relatively indulgent behaviour, particularly in sexual and aggressive areas, has been encouraged or at least allowed in the past.

The next topic, the origin of values in the individual, can be explained in terms of three concepts: emphasis, verbal mediation, and differential reinforcement. Take first emphasis: Gibson (1960), on the basis of persistent and massive work on perception, has concluded that

The essence of perception is selective attention to something important. The receptive system 'tunes itself' by adjusting the apparatus for clear reception . . . Each age of painting and each culture has its way of selecting what is important to see. (1960, pp. 220-226)

However, attention to these important and desirable events is ineffective if mere pointing is unaccompanied by appropriate speech on the part of the significant person doing that pointing: only in this way can there be any explanation of the meaning of the events to which the individual's attention is being directed (Luria, 1963, p. 85).

This brings us to the concept of verbal mediation, comprising the covert statements and rules we learn which make the stimulus world meaningful and direct the individual to an appropriate response. The Russian psychologist Luria (1963), for example, has shown convincingly that at first we overtly rehearse the statements made to us by significant others and then later, about the age of four or five, we learn covertly to rehearse them. Examples of such statements might be "Honesty is the best policy", "Honour thy father and thy mother", and "Brush your teeth after every meal". If the child exhibits appropriate behaviour over a period of time—if, that is, he is honest in his dealings with others, honours his parents and brushes his teeth after mealtimes—the covert rehearsal of the admonitions vanishes to be replaced by habits. The covert verbal mediation makes the behaviour more stable (*Ibid.*, p. 90) and, in the case of learning value rules, more meaningful in the sense that it can be thought about and evaluated. And so Luria contrasts the behaviour of the preschool child with that of the schoolchild.

The behavior of the small child differs in essence from that of the schoolchild; in the latter case, there is analysis of the conditions of the experiment, rules of behavior are formulated and only after this does the necessary movement begin to be accomplished; in the former, when a motor habit has been formed, it is never possible to speak about it (*Ibid.*, p. 89).

Of course, the appropriate behaviour can never be established consistently without differential reinforcement, i.e., the provision of rewards for it and of punishment for inappropriate behaviour (forgetting to brush teeth, for example). These rewards usually take

the form of presenting a favourable stimulus to the individual (a chocolate bar or affectionate gestures) or the removal of an aversive one (withdrawing a threat), and reciprocally, punishment usually takes the form of presenting an aversive stimulus (strapping, threats) or removing a pleasant one (confiscating a chocolate bar, withdrawing affection). It is generally agreed that the most efficient extrinsic reinforcement involves threatening the individual with some sort of unpleasant consequence unless he behaves in an appropriate way, and, if he obliges, removing the threat and presenting a suitable reward (Bandura and Walters, 1963, p. 15). Eventually, of course, this sort of extrinsic shaping up of behaviour will become unnecessary and the individual will travel along, apparently self-directed, by the impetus and direction of his own values, although these are only a faithful replica of what others have told him to say and do.

An important point of theory should be entered here, because the present writer's approach differs somewhat from that of Skinner. In view of Skinner's (1953, pp. 150-151) acceptance of the fact that motivation must be based on deprivation, and in view of the known fact that satiation of an organism reduces the motivating strength of any reinforcer (Crandall, Good, and Crandell, 1964, p. 487) it is a fair inference that there is a functional relationship between the extent to which an organism is deprived and the reinforcing strength of an appropriate stimulus, i.e., an organism satiated with food will not work for more food, and so on. Accordingly, a positive reinforcer can never consist only of the presentation of a nonaversive stimulus. To have any power over the behaviour of an organism, this sort of stimulus would have to reduce a previous state of deprivation, in which case it would represent the second sort of positive reinforcer involving the withdrawal of a previous aversive stimulus.

This means that any attempt on the part of the parent consistently to provide positive reinforcement in the form of affection or edibles will result in complete loss of parental control over the child's behaviour.

A relevant point is that two types of parental discipline are usually described: (1) object-oriented techniques (i.e., tangible rewards as incentives, deprivation of privileges as punishment) and (2) love-oriented techniques (i.e., praise as a means of reward, isolation and withdrawal of love as punishment). It is generally accepted that the only way to develop guilt feelings as a consequence of a transgression of moral standards is by the love-oriented technique; the object-oriented technique generates hostility to the punitive agent and a reliance on external threat before prosocial behaviour is adopted. (Sears, Maccoby, and Levin, 1957).

A third topic concerns the independent variables which influence the extent to which values are acquired and, correlatively, energize and direct behaviour. The first of these categories of variables concerns the parents as models for their children to imitate. In general, the extent to which parents are good models for their children will depend upon (1) the extent to which the behaviour of parents matches the values they teach, and (2) the extent to which the parents are favourably evaluated by their children.

However, there is scattered evidence impugning the power of the parents as models on both these counts. On the first count, Bandura and Walters (1963, pp. 204-205) present compelling evidence of the discrepancy between values and behavior among parents who presented a very desirable social "front". Contemporary novelists—Salinger, Moravia, and Susan Lund—have exploited this point to good effect.

On the second count, Keniston (1961) has inferred, although from fairly flimsy evidence, that technological advance has rendered adult values and roles so obsolete that the young consider parents irrelevant and unreliable models on which to shape their future lives.

An increasing number of young people are alienated from their parents' conceptions of adulthood, disaffected from the main streams of traditional public life, and disaffiliated from many of the historical institutions of our society (*Ibid.*, p. 156).

Seeing themselves as powerless in a cold, automated world, they emphasize private and immediate satisfactions—speed and stimulants, sex, friendships, artistic activities (1961, p. 155, p. 158, p. 160) and a disinvolvement in political life. All these values are reflected in current fiction—the uselessness and irrelevance of the parents as models (Vail, 1957, 1959); the confused state of adult values (Heller, 1961) and the concentration on private experiences divorced from social norms (Sinclair, 1959). However, it should be noted that Keniston's view (and equally that of Coleman, 1961) has been attacked by Bandura and Walters (1963) who conclude, on somewhat less flimsy evidence, that adolescents choose companions who will be acceptable to their parents and that the parent-adolescent strain is a myth.

A second category of variables influencing the acquisition of values is the extent to which a society is homogeneous with respect to the unquestioning acceptance of the values it promotes. This will occur if it is relatively isolated from others with different value systems. Wheelis (1958, pp. 91-92) points out that, in the isolated rural community of the late nineteenth century, values were stable and accepted without question as defining *the* right way of life.

Nowadays, in a heterogeneous city, many ways of life are offered, some of them incompatible with others. Such a dissonant condition makes for uncertainty in the sober mind, and uncertainty, as Berlyne (1960) has demonstrated, "... is manifestly one of the burdens that the human frame is least equipped to stand". (1960, p. 206)

These homogeneous communities are safe enough if they remain isolated and manage to convert incomers to their way of thinking. However, an influx of newcomers differently trained and with different values will always cause trouble. The conflict may very well be that between the moralistic and the scientific way of looking at behaviour (Seeley, Sims, and Loosely, 1956, p. 381).

For more urban communities, this concept of homogeneity concerns the extent to which their controlling agencies (government, religion, economics, education and psychotherapy) reinforce one another. A controlling agency makes clear its values in the form of rules and shapes up the corresponding behaviour of its suppliants by resorting to various reinforcements. The government, for example, relies almost exclusively on the two sorts of punishments described above: (1) removing positive reinforcers—fining, jailing the individual and dispossessing him of his property, and (2) imposing aversive stimuli—capital punishment, hard labour, and so on (Skinner, 1963, pp. 337-338).

Religion also enforces acceptance of its rules by threatening hellish, eternal damnation for transgressions labelled as sinful. However, it also uses both forms of positive reinforcement; if the individual does suitable penance and exhibits suitable future behaviour, the threat will be removed and he will qualify for favourable rewards. Religious control is sometimes opposed by the other agencies because of a conflict of rules or reinforcements involved, as in the cases of birth control, the use of contraceptives, the teaching of science (*Ibid*, p. 358), and the resort to punishment in the form of the presentation of aversive stimuli.

Economic and educational control use both sort of positive reinforcement: threat of removal of rewards (wages, grades and diplomas) contingent upon inadequate performance of a task and the presentation of these rewards together with other generalized reinforcers like approval and possibly affection from significant others, if the performance is adequate. This is not to deny the important reinforcing power of a performer's pride in his skill at the job and liking for it. Clearly, if he is kept at work largely because of threats (of dismissal, of poor grades), then the entire task may very well become aversive to him and he may leave or absent himself from it as soon as he can do so with impunity

(shortage of labour, reaching the leaving age,, arrival of Friday afternoon, and so on).

Psychotherapy differs from the other agencies of control partly in (1) its limited application in the community, and (2) its exclusive reliance on the presentation of a nonaversive stimulus in the form of Rogers' well-known "unconditional positive regard" on the part of the therapist for his patient, or of Skinner's (1963, p. 370) "nonpunishing audience". Indeed, most psychotherapies, even those most antithetical to one another otherwise, agree in opposing reinforcement based on the presentation of aversive stimuli or the inculcation of guilt. It is hardly surprising therefore, that psychotherapy and, to some degree, education should try to develop rules and practices that are at odds with the other, more socially desirable, agencies, and therefore with society at large. An obvious case in point is the handling of sexual behaviour. Religion and government still practise censorship, the removal of all stimuli calculated to activate sexual excitement, and the punishment of all transgressions labelled as sinful. The commercial world, by contrast, deliberately exploits sex for financial gain in a consumer economy, painting it as a thrilling "arousal jag" experience (Berlyne, 1960, p. 199). The psychologist as psychotherapist is faced with the appalling task of trying to reduce what he would consider to be the entirely unnecessary fascination with, and anxiety about, sex deliberately generated by the other agencies (Skinner, 1963, pp. 371-362).

A third and related category which influences the acquisition of values is the extent and speed of technological change which alters the material conditions of life in a society, thereby raising problems insoluble by the older institutional values representing conceptions of the desirable stemming from our quest for certainty and purveyed in myths, mores and religions. Examples of this clash between technological change and institutional values include the automobile and the contraceptive. The former provided a "... locale for misconduct" (Allen, 1961, p. 109) and the latter largely removed any untoward consequences of this behaviour. And yet the old sexual code is never revised, eliciting lip-service only from the majority (Collier, 1964).

A fourth but minor category of variables influencing the acquisition of values is their formal expression. Clearly, if the origin of values lies in verbal mediation, then it will be easier to retain and trot out values which can be phrased in a simple stereotyped fashion. For example, Havighurst and Taba (1949) have shown, and I have replicated this finding from the responses of Grade VIII Alberta students, that general slogans will be accepted by adolescents

without question—for example, “One has to sacrifice fun for honesty in life”—but exceptions and inconsistencies appear when these values are represented in specific situations, in which honesty appears to be a fairly dull virtue.

Whenever acceptance of a value entails behaviour which is personally inconvenient, and particularly if it brings the student into conflict with peer-group opinion, then he will be unwilling to undertake that action. In view of this, the strong and significant negative correlation observed between originality and group conformity is hardly surprising (Crutchfield, 1955). In brief, the first duty of the student is towards his own success. In any specific situation, behaviour implicit in any value which is at odds with this main principle will be disavowed. Perhaps this merely reflects the convenient adult tactic of subscribing to values so general and abstract that they have no direct and necessary connection with practical decision-making (nuclear war, divorce, and so on), a situation which allows the enlistment of these values in support of any solution to a problem. Consider, for example, the task of applying a value like upholding the dignity of the individual to concrete problems like nuclear war and free love.

A fifth sort of influence on the extent to which values are accepted is the extent of their congruency with registered information (Festinger and Bramel, 1962). Any event which reveals the irrelevance of values will cause them to be disengaged, at the very least, from behaviour. This has been strikingly exemplified in the sexual realm by Ellis (1962). There is supposed to be no sexual intercourse before marriage and yet women are encouraged to dress invitingly with plunging necklines, wispy bathing costumes and so on. As one young woman said to a salesgirl at a perfume counter, “I want something that will make me irresistible but won’t get me into serious trouble.” (Ellis, 1962, p. 75). And divorce is disapproved of, yet often arranged in a deceitful way with the collusion of husband and wife. Finally we educate the adolescent girl to prepare for a career and yet we also expect her to look forward to the work-role of a married woman, doing chores, having children and helping the husband along with his career (Rossi, 1964). In these situations, one of the values must be swamped in favour of its alternative, which may not be the socially desirable one.

A sixth influence on the acquisition of values is the extent to which the individual is involved in these values, i.e., the extent to which he is uncomfortable if they are not being realized in his own behaviour, or possibly in that of others also. In other words, a test of whether an individual is so involved is what he is willing to suffer rather than transgress them. For example, Bettelheim

(1960, p. 122-123) has observed that the prisoners in Nazi concentration camps who stood up best to camp life were the Jehovah's Witnesses, who preferred interment and even death to taking up arms—a considerable index of their involvement in their value system.

As Getzels has pointed out, lip-service only is being paid to some "sacred" values by United States' adolescents and by all except the most vigilant and informed adults: these would include democracy, individualism (the power of the individual as a source of energy, initiative, responsibility, and his right to self-expression), equality before the law, and so on. Remmers and Radler (1957, pp. 15-16) have shown that more than half of the students in junior and senior high schools in the U.S. assent to ideas at odds with the democratic process: for example, the idea that most people are not capable of deciding what is best for themselves, the use of legalized wiretapping, the third degree, and censorship of books, movies, radio and T.V. to protect them against improper thinking. Nearly half of the students would dispense with the freedom of the press.

The fact of intergroup variation in values accepted can be ascribed with a fair amount of certainty to the fact that each group reinforces its members for appropriate behaviour keyed to different aspects of stimulus situations. Thus white children in the American South learn, from observing their parents' words and deeds, whom they should hate, why they should hate, and the appropriate aggressive behaviour towards the American Negro (Bandura and Walters, 1963, p. 19). In much the same way, deviant behaviour (delinquency, dropping out of school, and so on) may result from a failure to absorb an adult value system which is not accepted by students.

There are certain important independent variables associated with the acquisition of different values by people in the same community. Firstly, the parents may possess unusual values and reinforce the child for following suit. Secondly, there is the power (in terms of degree of nurturance of prestige) of alternative models; for example, the greater power of sporting models (football, ice-hockey, and baseball) as against educational models (teachers, parents) is not in dispute (Coleman, 1961) nor is the ineffectiveness of the school's influence on students' values (Getzels, 1957). Thirdly, the child may so dislike a parent that following parental values is not even considered: Freud, for example, despised his father and "identified with" the Carthaginian general Hannibal (Fromm, 1959, pp. 55-57).

These points can best be illustrated by considering the most efficient way of producing an aggressive and a nonaggressive child.

The aggressive child is likely to be the product of a number of converging variables: (1) consistent and emphasized aggressive behaviour by the parents or significant others in the environment; (2) strong positive reinforcement (praise, approval, regard) for this behaviour and withdrawals of these together with physical punishment for prosocial behaviour (Selby, 1964; Morrison, 1946), and (3) complete separation of the child from people who emphasize and reinforce nonaggressive behaviour. Correspondingly, the non-aggressive child will be produced by the following variables: (1) a nonaggressive father who is well-liked, i.e., a father who reacts consistently in a nonaggressive way to frustrating situations (it is often possible to note that outbursts of verbal and physical spleen by parents are copied very quickly by preschool children); (2) positive reinforcement for prosocial behaviour and withdrawal of affection for aggressive behaviour, and (3) contact on the part of the child with like-minded families and an absence of contact with "the rougher element" of society.

Admittedly there are other variables which may occasionally usurp the power of those previously mentioned. For example, we have ignored certain personal characteristics such as (1) the extent to which the parent exhibiting the behaviour has prestige and success in terms of values accepted by the child (occupational success, socio-economic success, and so on); (2) the extent to which the individual is dependent on others, and (3) the extent to which the child sees himself as like the model in some important attributes (Bandura and Walters, 1963, pp. 84-85). Two other variables would be the age (especially the extent of administrative seniority of the individual) and his academic performance. Both Spindler (1955) and Getzels found that older as against younger teachers and superior as against inferior students preferred "traditional" values such as the work-success ethic (vs. sociability), future-time orientation (vs. present-time orientation) and very rigid morality.

The question of the effect of socioeconomic status on the sorts of values possessed by the individual, is a vexed one with no consensus appearing. Karl Marx took the view that the most important factor determining a man's values was the social relations he enters into as a result of his means of earning a living. Consequently, values will vary from one sub-group in society to another, according to the group's relationship to the means of production. Therefore proletariat and bourgeoisie will differ in their moral principles because they differ in their relationship to the means of production. There is some evidence for this view from primitive societies—for example, Kardiner (1939) noted that changes within the economic structure of one tribe brought about changes in the value systems

accepted by tribal members—but in today's complex societies, class differences across cultures are not stable. Indeed Miller and Swanson (1960), working in Detroit, found that entrepreneurial (self-employed) fathers brought up their children in a way that resembled the entrepreneurial working-class father, sponsoring self-control, active and independent behaviour, and quite different from the way of the bureaucratic middle-class father who adopted a more relaxed and indulgent approach to child rearing.

Finally, what can be done to modify values? The psychologist might offer some or all of the following principles: firstly, teachers should emphasize both in themselves and in other (perhaps fictional) characters the desired behaviour and associated values, and, secondly, adequate positive reinforcement should be provided for any, even faltering, attempt on the part of the child to behave appropriately and negatively reinforce (preferably by withdrawing something desirable to the child) repetition of, or regression to, behaviour of an undesirable sort; thirdly, any other interfering model should be removed or downgraded—as far as this is possible, and finally, matters should be arranged so the child can have some regard for the teacher. In connection with the last point, it should be recalled that continuous affection will reduce the power of that affection through satiation and occasional unwillingness to tolerate poor conduct or attitudes will strengthen that power.

Finally, while the psychologist will rarely be as bold as an educator like Stendler (1949) who offers advice about which values to promote, which to de-emphasize, nevertheless he is professionally dedicated to the teaching of instrumental values (Wheelis, 1958, pp. 74-75) which are based on reality and the instruments which have enabled man to make sense of it. Outstanding among these values are scientific methods and the great organizing ideas these methods have made possible. Therefore, stress should be laid on values such as objectivity, conceptual analysis based on reality testing and observation, intellectual honesty and the sort of logical rigour which Piaget (1950) and Inhelder and Piaget (1958) find appropriate to the stages of concrete and formal operations. However, little hope can be held out for such a policy because of the irrational quality of the beliefs of adult models who enjoy highest esteem (Ellis, 1962).

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THE RELATION OF THE BROKEN HOMES TO SUBSEQUENT SCHOOL BEHAVIORS

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The majority of studies regarding children from broken homes are chiefly concerned with the influence that family break-up has upon delinquent behavior. A number of investigators stress the negative developmental influence that family disruption produces (Wattenburg, 1955; Goode, 1956; Martin and Stendler, 1959; McCord and McCord, 1962; Havighurst, 1962). The relation of family disruption to deviant behavior is viewed by these investigators to be a function of (1) lack of identification models, (2) perceived parental rejection, (3) "unstable homes" and (4) "emotional" loss of support.

Unfortunately, other evidence indicates that the relationship between negative social behavior and broken homes is quite complex. Social class factors contaminate the problem, for a higher incidence of broken homes obtains within the lower classes (Hollingshead, 1949; Burchinal, 1964). Thus, much of the reported deleterious effects of family disruption may be due to the social factors associated with class membership rather than broken homes *per se*. Further, the age of the child at the time of parental separation is reported to be significant. Monahan (1960), Glueck and Glueck (1956), and Kvaraceus (1949) indicate that family disruption during early childhood produces a higher incidence of deviant behavior.

The present study reports data regarding the influence of broken homes upon three school-related behaviours: (1) 6th grade school attendance (2) 6th grade reading achievement (3) reported 6th grade school behavior problems (see Methods for a description of these variables). In view of the evidence regarding the relationship of broken homes to delinquency, this exploratory investigation considers:

- (1) the year in school at time of break-up
- (2) the socio-economic status of the home
- (3) the sex of the child and the sex of the remaining parent

Method

Subjects:

Eight hundred-eighty six, 7-8 grade students attending 5 Edmonton, Alberta junior high schools completed a questionnaire from which 131 Ss (62 male, 69 female) were determined to be from broken homes. One hundred twelve of these homes were fatherless, and 19 were motherless. Using Cochran's (1953) systematic sampling procedures 131 Ss (62 male, 69 female) were alphabetically selected from intact homes as controls.

Criterion Variables:

School attendance, the number of days attended by the student during the 6th grade as recorded in the cumulative school record was noted.

Reading achievement, the sixth grade score on the Edmonton Public School United Scale of Attainment Reading Test, Division II, Form B as recorded in the cumulative school record was used (administered during the spring of the sixth school year).

Behavior problems, teacher rating of student's behavior into one of three categories: (1) very unfavorable (2) unfavorable (3) favorable (see North, 1965, p. 75).

Predictor Variables:

Parent Sex, sex of the remaining parent.

Subject Sex, male or female.

Status of Home, intact or broken.

Nature of Breakup, death or separation.

Year in School at time of Breakup—categorized into (1) pre-school, (2) grades 1-3, (3) grades 4-6.

Covariable:

Socio-Economic Status

Elley's (1961) adaption of Gough's (1949) "A SHORT SOCIAL STATUS INVENTORY", based upon Ss reported home characteristics.

Analysis and Results

A series of Multiple Linear Regression Models (see Bottenberg and Ward, 1963) were designed to answer the questions noted below. In all analyses the effects of socio-economic status were statistically controlled.

1. Broken Homes (B.H.) vs. Intact Homes (I.H.).

- (a) Do B.H. Ss perform more poorly on reading achievement than do I.H. Ss? No significant difference ($F < 1$) was noted between the two groups in relation to reading achievement.
- (b) Do B.H. Ss attend school less often than do I.H. Ss? An F of 7.08 ($df\ 1/259$) $p < .01$ was obtained. Children from broken homes on the

average attended school 3.99 fewer days than did children from intact homes.

- (c) Do B.H. Ss manifest more behavior problems as rated by teachers than do children from I.H.'s? No significant difference between group ($F < 1$) on this variable was noted.

2. Among Broken Homes

- (a) Does the year in school at the time of family breakup influence the Ss reading achievement? An F of 5.51 ($df\ 2/126$) $p < .01$ was found. Figure 1 shows the relationship using the mean socio-economic status score (8.5) as covariable.

RELATIONSHIP BETWEEN READING ACHIEVEMENT
AND THE TIME OF BREAK UP OF THE HOME

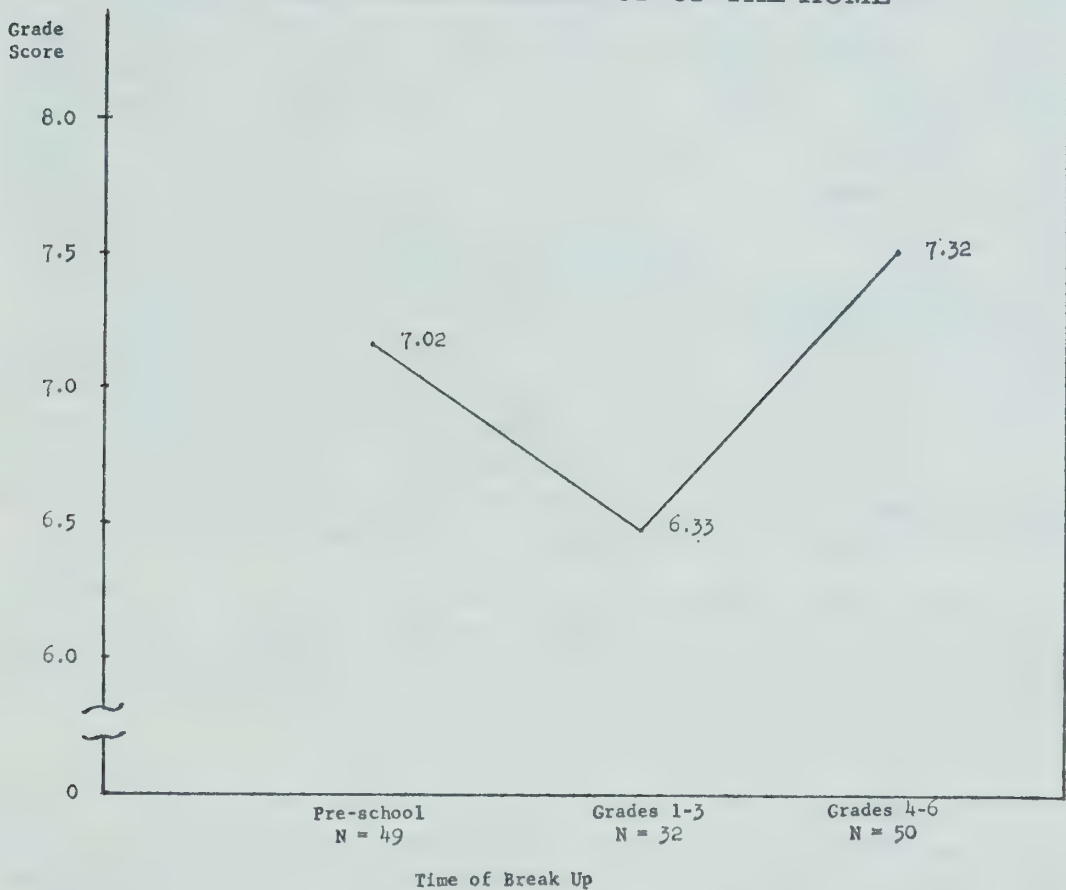


FIGURE 1
S.E.S. = 8.5

The relation is curvilinear with the Ss whose home was broken during grades 1-3 performing lowest on the 6th grade reading test.

- (d) Does the year in school at the time of family break-up influence the Ss being rated a behavior problem? No significant difference ($F < 1$) among group on this variable was noted.
3. Father absent homes vs Mother absent homes. Children from father absent homes ($N=112$) performed significantly poorer ($F 4.37\ df 1/128\ p < .05$) on sixth grade reading achievement than did children from mother absent homes ($N=19$). (Note difference in number of subjects in sample)
4. Sex of child.
No sex by classification interactions were found. Apparently the above noted differences affected both sexes equally.

Discussion

The data reported here indicates that when socio-economic status is controlled, family disruption *per se* does *not* have a uniform deleterious effect upon the child's subsequent reading performance. On the other hand, 6th grade reading achievement is related to the year the child was in school at time of family break-up. Figure 1 shows the predicted mean on reading achievement for each of the three levels. Apparently, family disruption prior to school entrance does *not* adversely influence the child's subsequent reading performance (predicted mean for intact home sample was 7-1 grade placement). Likewise family disruption between grades 4-6 may have a mildly facilitatory effect upon reading achievement rather than debilitary ($M = 7.32$). The finding that family break-up during the first three years of school does have an adverse effect upon reading achievement was striking ($M = 6.33$). One may speculate that coping with a changed home environment while adjusting to the early school demands exceeds the child's adaptation repertory, with subsequent school retardation as a consequence. These data represent only 5 school settings, however, if these findings are not unique, then the teachers and administrators may wish to give special attention to the primary school children whose homes break-up. To be sure further replications are desirable before firm recommendations can be made, nevertheless the sample population of this study was of sufficient size to merit consideration.

Children from mother absent homes performed on reading achievement superior to children from father absent homes. The mother absent homes ($N = 19$) is of such a small size that speculation regarding the implications of the superiority would be barren. Further research in this area may prove fertile.

Although the children from broken homes attended school fewer days than children from intact homes, these children did not on the whole appear to achieve less as a consequence. The 3.99 fewer days attendance for broken home Ss, although statistically significant, apparently are not practically significant.

The lack of difference between children from broken and intact homes on teacher rated school behavior problems is contrary to the evidence found among delinquents. The socio-economic status covariable does not account for this negative finding. In essence the behaviour rating does not correlate with any of the variables investigated. A possible factor may be variability due to teacher use of the rating scale. No reliability estimates for the judges were available. These findings may represent the well known difficulty in obtaining consistent judgements without extensive judge training.

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A TEN YEAR FOLLOW-UP OF LOW BIRTH WEIGHT INFANTS: INTELLECTUAL FUNCTIONING

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Introduction

The research appears to point out that low birth weight children differ from average birth weight children in later intellectual and physical functioning. The degree of difference appears greatest soon after birth and gradually disappears, but some differences have been found at seven years of age. Physiological factors seem to play a significant role in determining the intellectual ability of the low birth weight child though social background, experience, and personality all affect intellectual rating, as with normal children. If brain damage is present it appears to show up to the greatest extent among pre-school children. The work of other investigators stresses a difference of one standard deviation in I.Q. between the two groups of children. There is general agreement about this difference up to seven years of age, but thereafter it becomes rather controversial.

Problem

This study has two purposes, (1) to investigate the intelligence rating of a group of ten year old, low birth weight children, and (2) to investigate the physical development of these same children. The physical development has been reported elsewhere (Salter *et al* 1965).

Related Research

The literature on the effects of low birth weight is of a very conflicting nature. Hebb (1934) states that premature birth unassociated with intracranial injury does not affect mental development. This opinion has been frequently reported; e.g. Beskow (1949), Alm (1953), Douglas (1956).

In Edinburgh, Drillien (1963) found that the control group of average birth weight children up to five years of age showed little evidence that complications of pregnancy and/or delivery had any effect on later intellectual functioning; although in both average and low birth weight groups of children such complications were significantly associated with an increased evidence of behaviour disturbances. It would appear from the above work that brain

damage seldom occurs during birth and that most failures to breathe occur because of damage in the intra-uterine passage.

Drillien (1964) also reports that when children of low birth weight are compared with mature children (children with a birth weight of over 2,500 grams, 5 lbs. 8 oz.) regardless of the length of gestation, they display an average lower intelligence rating at five to seven years of age. Douglas (1956) too, found that low birth weight children, at seven years of age had a lower intelligence rating by the method he used for evaluating his sample. The methods of evaluating seems to affect the work of each of these researchers. Perhaps it is the method of evaluating that varies, because each investigator used a different form of test, all supposedly measuring I.Q.

The intelligence rating of school children of different birth weights was investigated by Asher and Roberts (1949). They tried to find a correlation between birth weight and I.Q. of 4,800 children attending regular school in England. They also considered 877 children in special schools for the educationally sub-normal. The children found to be certified as mental defectives had a lower mean birth weight. They found four times as many children with low birth weight (below 1,247 grams for girls and 1,447 for boys) among the children who were mentally below normal as there were among the mentally normal children. They attributed this high proportion of sub-normal and mentally defective children to an excess of very low birth weights among the children.

Alm (1953) carried out a follow-up study on a group of nearly 1,000 premature and mature children. Alm picked a sample whose initial status was not markedly poor. He found that the premature children when they became adults constituted no greater burden on the community than did the control group. There does not appear to be any specific area where the premature group lagged behind their control group in any of the areas that Alm investigated.

There have been a large number of studies made in an effort to determine the mental development of low birth weight children. Benton (1940) published a critical review of American and European studies made since 1911, and reported a wide divergence of opinion in the published literature. He suggested that the discrepancies were the result of the following:

1. use of clinical impression, and other subjective criteria instead of standardized tests;
2. little attention being paid to the socio-economic character of the children under study;
3. inadequate numbers and unsatisfactory controls;
4. the selective nature of the sample.

In this study actual measurements and standardized tests were used to counteract the impressions and eliminate subjective criteria as much as possible. The socio-economic character of the children's homes was taken into consideration, as well as it could be gauged from a questionnaire. Sufficient numbers were used to obtain significant results. First born children of very young mothers who are often of low birth weight were under represented in this study.

The literature on children of low birth weight appears to bring forward a number of common factors affecting these children. Perhaps the most salient one is the factor of age when tested. It seems to be that the older the child, the less difference there is between him and his average birth weight peer. Coupled with this is the birth weight of the child. It is agreed that the children below 1,500 grams do have far more problems than any other group, for it seems that for every 100 grams increase in the birth weight there are fewer factors setting these children apart from the average group.

The Hypotheses

On the basis of the relevant literature, the following hypotheses were formulated:

1. That low birth weight children at ten years of age will make lower scores on the Wechsler Intelligence Scale for Children than a group of normal birth weight children.
2. That the birth weight of low birth weight children is correlated with the I.Q. score.
3. That the development of low birth weight children will be a function of their home environment as measured by such factors as economic level, parental grade accomplishment and parental occupation.
4. The low birth weight children have a higher incidence of inadequate physical development, physical deformity and an increased incidence of illness than do normal birth weight children of the same age.

Experimental Design and Procedure

The definition of a low birth weight infant was that recommended by the American Academy of Paediatrics (1964), "A live born infant with a birth weight of 2,500 grams (5½ lbs.) or less." The sample was drawn from the three-year period 1952-54 when 215 low birth weight infants were delivered at the University Hospital in Edmonton, Alberta. From this group it was possible to examine 45 out of the first 50 survivors who could be contacted by mail, telephone or personal visits. Of the five who could not be examined, four had died in childhood and one was in an institution for the mentally retarded.

The problem arose as to whether the remaining 45 children constituted a highly selected group or whether they came from

families representative of the Edmonton population. A comparison of the income of the father and highest educational achievement (school grade or University) with that of known averages for Edmonton showed that the sample was not selective in favour of any particular socio-economic or intellectual group. The only unusual feature of the sample was that 21 of the children were the survivors of eleven sets of twins.

The birth weight of the 45 children ranged from 1,400 to 2,500 grams with an average weight of 2,050 grams.

TABLE I
BIRTH WEIGHTS

Grams	No. of Infants
1350-1800	7
1801-2250	17
2251-2500	21
Average birth weight	2050 grams

The children and their accompanying parents were questioned and examined by one group of investigators in the Faculty of Educaiton and by another group in the Department of Paediatrics. The particular responsibility of the Educational group was to assess:

- 1. Various paramaters of intelligence and developmental quotients by completing the full scale Weschler Intelligence Scale for Children.
- 2. The socio-economic standing and educational achievement of the parents.

Statistical analysis was carried out in the computing centre at the University of Alberta. Three programs were used:

- A. Testing the significance of difference between uncorrelated means.
- B. The homogeneity of variance to test the distribution of variables in the population.
- C. An analysis of variance in a two-way classification with only one sample was carried out.

Results

- 1. The study found that there were no significant differences between the intelligence ratings of low birth weight children and mature children at ten years of age in an Edmonton sample. The low birth weight children had a mean Full Scale score of 116.6 on the WISC which compares with an Edmonton mean of 115.3 on the same scale (Dockrell 1962).
- 2. There was no correlation between the I.Q. score of low birth weight children and their birth weight, when their birth weights were sub-divided into five groups. The group of children with the lowest birth weights, from 1,446 grams (3 lbs. 14 oz.) to 1,758 grams (5 lbs. 3 oz.) did not have any lower mean

intelligence than any other group or even the control group of mature weight children whose mean birth weight is 3,200 grams (7 lbs. 1 oz.)

3. The home environment did not show a significant relationship with the physical development of low birth weight children.

The relationship between home environment, physical development and Intelligence Quotient was tested by the analysis of variance. There was no significant difference for the factors concerned. The I.Q. score had a range from 85 to 138 on the WISC so it appears that there was some factor other than home environment and physical development producing the large range in scores. For this group the home environment did not have a deleterious effect upon the intellectual and physical development of the children.

4. The low birth weight children did not have a higher incidence of inadequate physical development, physical deformity or an increased incidence of illness than do the mature children of the same age. All of the children of this sample were over three pounds at birth. This perhaps explains why there was not the significant amount of physical deformity in this group that was found in other studies using children of less than three pounds birth weight. The only physical defect that was present was a much higher proportion of myopia than found in a group of mature children of the same age (Salter et al 1965). The literature does suggest a large amount of illness during the first year of life; and the medical history of the sample bears this out. As the children became older, they seemed to grow out of these illnesses and to resemble their peers, with no more and no less incidence of illness.

Summary, Conclusions and Implications

The low birth weight children performed equally well on the intelligence tests, when compared to the children of average birth weight. Drillien (1964) found a higher incidence of inferior mental ability in very low birth weight children but suggested that as the children get older they approach the level of ability of their peers. The data shows that by ten years of age they have reached the equal of their peers.

The information gained in this study shows that birth weight within this range is not correlated with the I.Q. score. The higher incidence of school failure expected did not take place among the children of the sample.

This study suggests that low birth weight children retain the same chance for a normal school career as any other child. The

child apparently has a similar I.Q. rating and therefore should be treated the same as mature children of the same age at school and in all other intellectual training that is available.

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ABILITY GROUPING AND GRADE NINE ACHIEVEMENT

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Introduction

One of the problems facing teachers is the difficulty of providing within the classroom for the educational needs of students having a wide range of ability. Administrators and teachers searching for ways of meeting this difficulty have continued to look carefully at ability grouping as a possible solution. The rationale underlying homogeneous or ability grouping suggests that it is possible to select students in a narrow achievement range in a given curriculum area, thus permitting the teacher to use mass teaching procedures which will ultimately widen the range of student achievement. As a result, the teacher will be able to help the homogeneous group more effectively than he could if all levels of achievement were present.

While it is generally accepted that homogeneous grouping reduces heterogeneity in individual subjects by only 20 per cent of the original range, it has been argued that this reduction is worthwhile. It is generally agreed, however, that subject grouping, a refinement of homogeneous grouping, can reduce heterogeneity in a subject to a much greater extent.

The formation of homogeneous classes of students does not only simplify the teaching process and thereby provide more teacher time for the individual student, but also can introduce the element of competition. Parental pressure and individual desire can raise the level of aspiration. Bright students are placed in situations where they are not held back by the practice of teaching to the lower level of the group, and slower students are not faced with the frustration caused by attempting to equal the learning rate of their superior peers.

Review of the Literature

Five reviews of the literature summed up the findings of research with regard to ability grouping. Otto (5) in 1950, Goodlad (3) in 1960, Wilhelms and Westly-Gibson (7) in 1961, Ekstrom (1) in 1961 and Passow (6) in 1962 found that, while the effectiveness of grouping was still undecided, certain indications were becoming evident. First, homogeneous grouping, in spite of the difficulties of sectioning, may be effective if accompanied by differentiation of methods and materials and the active participation of teachers and pupils. Secondly, grouping finds its greatest support and acceptance at the secondary school level where the range in individual differences reaches a maximum. Thirdly, research is being urged in the

direction of subject grouping where greater homogeneity in a particular aptitude and interest may be obtained. Fourthly, research is concerned with the optimum development of the individual child whatever the level of his ability may be. Fifthly, while many educators believe in ability grouping as one means of meeting individual differences, they generally caution the teacher against the assumption of homogeneity in any area.

Few studies had much in common in content, method or type of subjects used. Few of the experimenters took into consideration the possibility that factors other than grouping could influence test scores. Basic weaknesses in research techniques, weak sampling procedures, poorly matched groups, inadequate testing instruments and short-term studies raised doubts as to the validity of conclusions. Most of the experiments ignored the all-important teacher variable. Godwin (2) in 1962 pointed to the differences between American and Canadian school systems, and questioned the use of most American studies of ability grouping for consideration in the Canadian context. Goodlad (4) in 1963 wrote that interclass grouping is a practical necessity, if only to utilize effectively both available teachers and available space.

The Problem

The main purpose of this study was to determine the relationship between three forms of grouping—heterogeneous, homogeneous and subject—and the achievement of grade nine Parkview school students at three ability levels on the provincial Grade IX final examinations. The study was confined to Parkview grade nine students over an eight-year period from September, 1956 to June, 1964.

The study actually consisted of two parts. The first compared achievement at three ability levels in the six departmental subjects (reading, literature, social studies, language, mathematics and science) during a three-year period of heterogeneous grouping with that during the next three-year period of homogeneous grouping. The second studied the relationship at three ability levels between achievement in language, mathematics and science and the three methods of grouping, subject grouping being carried out in the three subjects during the final two years.

Design of the Study

Population

The population consisted of all grade nine students at Parkview school for the eight school years between September, 1956 and June, 1964.

Heterogeneous grouping was carried out with a total of six classes (204 students) in the first three years. Homogeneous grouping (on the basis of grade VIII academic achievement) was carried out with a total of twelve classes (366 students) in the next three years. Subject grouping in language, mathematics and science (on the basis of grade VIII academic achievement in each one) was carried out with a total of five classes (154 students).

Sources of Data

Subject stanine scores and the School and College Ability Test percentiles were obtained from the achievement records of the Examinations Branch, Department of Education. Teacher characteristics were available on Department of Education "A" cards; pupil characteristics on Cumulative Record cards and class registers.

Methods of Analysis

Two parallel analyses were carried out. The first was based on thirty-two matched pairs for each of three ability levels (Laycock IQ 154-117; 118-107; 108-82) and selected from each of the three periods of grouping. Pairs were matched on the basis of sex, chronological age, attendance, SCAT percentile and Laycock IQ. The second was based on a similar number of cases chosen randomly but with a wider ability range for level two. (Laycock IQ 154-122; 123-107; 108-85).

Analysis of variance: three-way classification was followed by analysis of variance: two-way classification and then by the appropriate t-tests where significant differences were indicated.

Summary of the Findings

Heterogeneous Homogeneous Grouping

Table I summarizes the findings for the analysis of the data on these two methods. Both matched and random data showed a difference, significant at the .001 level, stanine scores under homogeneous grouping being superior to those under heterogeneous grouping. Differences in achievement among the six departmental subjects were significant at the .001 level. F-tests indicated that pupils did better in homogeneous classes in social studies, language, mathematics and science. For reading and literature no significant differences were shown. t-tests indicated that significant differences were located primarily at level one and then at level three; none at level two. All differences in means for social studies, language, mathematics and science supported the inference of superiority for homogeneous grouping.

TABLE I
SUMMARY OF ANALYSIS OF DATA:
HETEROGENEOUS/HOMOGEIOUS—2 × 3 × 6

ANALYSES	MATCHED PAIRS DATA	RANDOM DATA
Analysis of Variance:	Homogeneous superior (.001)	Homogeneous superior (.001)
Three-way classification	Subject achievement diff. (.001)	Subject achievement diff. (.001)
2 methods	Interaction:	Interaction:
3 levels	Grouping × Subjects NSD	Grouping × Subjects SD (.01)
6 subjects	Other interactions: NSD	Other interactions: NSD
Analysis of Variance:	Interaction: NSD for any subject between method of grouping and ability levels	
2-way classification		
Reading	NSD	NSD
Literature	NSD	NSD
Social Studies	SD .01 level	SD .01 level
t-tests Level 1	SD .02	SD .01
Levels 2, 3	NSD	NSD
Language	Note quite .05	SD .02
t-tests Level 1	Not quite .05	SD .02
Level 2	NSD	NSD
Level 3	NSD	SD .05
Mathematics	SD well beyond .01	SD well beyond .01
t-tests Level 1	S.D. .01	SD .01
Level 2	NSD	NSD
Level 3	SD .01	SD .01
Science	SD .05	SD .01
t-tests Level 1	NSD	SD .01
Level 2	Not quite .05	NSD
Level 3	NSD	NSD

In all cases differences in means favoured homogeneous grouping over heterogeneous. In all analyses, achievement by the three ability levels was significantly different at well beyond the .01 level. NSD: no significant difference; SD: significant difference.

Heterogeneous /Homogeneous Subject grouping

Table II summarizes the findings for the analysis of the data on these three methods in language, mathematics and science. Significant differences in achievement were found for methods, subjects and levels.

Achievement among the three subjects varied with the methods of grouping. F-tests indicated that subject-grouped pupils in language did better than those in homogeneous classes, significant (matched) at the .01 level and (random) not quite .05. In mathematics, F-ratios for these two methods showed no significant difference. In science, homogeneous classes did better than those subject-grouped, significant (matched) at the .05 level and (random) at the .02 level.

SUMMARY OF ANALYSIS OF DATA: HETEROGENEOUS/HOMOGENEOUS/SUBJECT GROUPING

	Matched Pairs		Random Data	
	Matched	Random	Matched	Random
Analysis of Variance $3 \times 3 \times 3$	S .035	S .05	S .01	S .01
Subject achievement	S .01+	S .01+	S .01	S .01
Grouping Achievement	S .001	S .001	S .01	NS
Levels	S .01	NS		
Interaction: Group. $\times$ Subj.				
All other interactions				
	Language		Mathematics	
	Matched	Random	Matched	Random
Analysis of Variance 3×3				
Grouping	S .01	S .01	S .01	S .01
Levels	S .01	S .01	S .01	S .01
Interaction: Group/Levels	NS	NS	NS	NS
Analysis of Variance 2×3				
Homogeneous/Subj. Grouping				
Grouping	S .01	NS .05—	NS	S .04
Levels	S .01	S .01	S .01	S .01
Interaction: Group/Levles	NS	NS	NS	NS
t-Tests				
Heter/Homo: Level 1	NS .05—	S .02	S .01	S .01
Level 2	NS	NS	NS	NS
Level 3	S .01	S .05	S .01	NS
Heter/Subj. Grouping: Level 1	S .001	S .01	S .001	NS
Levle 2	NS	S .01	S .05	NS
Level 3	S .01	S .05	S 0.1	NS
Homo/Subj. Grouping: Level 1	S .05	SN	SN	S .01*
Level 2	NS	S .02	NS	NS
Level 3	S .01	NS	NS	NS

In t-tests all significant differences favoured the method on the right, except *. For language and mathematics all differences in means favoured the methods on the right. Homogeneous means were highest at all levels in science.

Some Conclusions and Implications

Homogeneous Grouping

The results of the analysis of pupil achievement comparing heterogeneous and homogeneous grouping provided fairly conclusive evidence on favor of the latter. In social studies, language, mathematics, and science all significant differences and all differences in means supported the inference and suggested that, in general, for Parkview school and schools with similar characteristics (on a judgmental basis) there may be advantages to be derived from homogeneous grouping in these subjects. It should be noted too that there was no drop in achievement at any level.

The greatest advantage was evident in mathematics where the starting achievement level was lowest. Results for literature were inconsistent with the general tendency, and may have been influenced by the fact that the original literature achievement means was the highest for all subjects. Since reading was not scheduled as a regular subject, the results were only of academic interest.

Homogeneous grouping seemed to produce greater pupil effort. The element of competition and the strong desire of many parents for their children to achieve level one or at least a level in line with the individual's innate ability were probably a factor in raising the level of aspiration.

Subject Grouping

The general inference that subject grouping would produce higher academic achievement was not statistically borne out in this study. For language the evidence supported the superiority of subject grouping over homogeneous and suggested its utilization for maximum positive results. No general tendency was evident in mathematics since matched data showed subject grouping means higher by .291 stanines and random data lower by .072 stanines. In science any general tendency would appear to favour homogeneous means (matched) being .417 stanines higher and (random) .468 stanines higher.

Implications

A major weakness in previous research on grouping seems to have been the assumption that it might produce a blanket effect across all grade levels, in all subjects and at all ability levels. The mass of conflicting results have negated this expectation. The need for consideration of all pertinent factors in achievement—teacher education, experience and personality, class load and others—in order to assign a relationship is confused by the fact that many such factors have not been assessed at all grade levels and in all subjects.

Significant differences in achievement by subjects raises the question of subject differences in objectives, content and methodology. It is possible that this factor may affect significance as much as differences in the original achievement level.

This study, instead of bearing out the literature's expectations of greater effect for subject grouping, raised other questions that remain unanswered. If subjects grouping is carried out in only one subject, is it generally effective in raising academic achievement in that subject? Is the positive effect of subject grouping limited by an inability of students to concentrate in more than one field? Does concentration of class effort in one subject tend to lower achievement in any other subject? If an optimum level of achievement is reached in one subject with the use of subject grouping, is this new level of attainment maintained if subject grouping is switched to another subject the following year?

Finally, in the analysis we have used both matched pairs and random selection; both methods appear to have validity. Generally conclusions for either method are similar. Some of the differences between t-tests for the two types of data may be attributed to the difference in range for level two. It would appear that, if the number of cases used is fairly large, there would be little difference between the methods in the means of pupil characteristics. Even though the standard deviations for matched pairs is smaller, the effect does not appear to warrant the extra effort required in matching.

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RELIGIOUS AFFILIATION, SOCIAL CLASS AND THE ACHIEVEMENT-ASPIRATION RELATIONSHIP AMONG MALE HIGH SCHOOL STUDENTS*

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This papers presents a partial report of the findings of a survey conducted in the City of Calgary school system during the spring of 1963. Calgary has at present a population in excess of 300,000 persons. It has been characterized in the past twenty-five years by a rapid population growth. Traditionally a centre for the processing and distribution of farm products, Calgary has of late been strongly influenced by the growth of an oil and gas extraction and processing industry whose administrative nexus is located there.

As with all surveys, the present one had a number of objectives in purview. The one discussed in the present paper, however, was to determine the influence of religious affiliation and social class background upon academic performance as well as certain aspects of career planning and occupational aspiration. The index of social class employed in the analysis of the data was father's occupational class, and the data are reported for male high school students only.

The Sample

Both Calgary's public and separate school sysetms were sampled (1). Male students attending the centralized and only separate high school for boys constitute the separate school system sample. Alternatively, because the total enrollment in the public school system is much greater, males constituting the public school system sample were drawn from three different public high schools. These three schools were selected on the basis of their location in residential areas characterized by high, middle and low socio-economic status, and they are referred to as School A, School B, and School C, respectively.

Limitations upon available resources precluded surveying all of the students enrolled in the schools represented. Thus, the samples were drawn from each of the four schools according to the following procedure. First, it was desired that Grade X, XI and XII be more or less equally represented. Second, that students classified by the school authorities as high, medium and low achievers should be more or less equally represented. Third, that in order to minimize

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the disruption of the school's routine the required quotas of students be drawn from established school classes. These stipulations were substantially realized. Finally, it was specified that as nearly as possible the total sample of students drawn from any given school should not be less than 10 per cent of the student body enrolled in the school at the time of the survey. Within these limits, then, the actual school classes selected for inclusion in the sample were chosen on the basis of convenient availability on the day the survey was conducted. The end result may be described as a representative quota sample. The relationship between the sample sizes and the total number of students enrolled in the respective schools is reported in Table I.

TABLE I
RELATION OF SAMPLE SIZE TO TOTAL SCHOOL
POPULATION BY SCHOOL AND BY SYSTEM

	Total N	Sample N	% of Total
School A	1040	153	14.7
School B	684	154	22.5
School C	312	91	29.1
Public School Totals	2036	398	19.5
Separate School Totals	937	241	25.2

Table I shows that the samples drawn from the three public high schools ranged from 14.7 per cent in School A through 22.5 per cent in School B and 29.1 per cent in School C. In one instance the sample is less than the specified minimum of 10 per cent. When the three respective public school sub-samples are added, they comprise a total of 445 students and constitute 19.5 per cent of the total enrollment in these schools. The 241 students representing the separate school comprise 25.2 per cent of the total number of students enrolled in this school.

The Data

Previous studies which have attempted to account for variation in academic achievement and career aspirations have consistently found a significant relationship between these phenomena and religious affiliation, on the one hand, and social class background, on the other (2). Seldom, however, has a research opportunity such as reported here presented itself in which religion and social class as well as curricular and organizational factors could be simultaneously and more or less effectively controlled. Without simultaneous and effective control of these variables it is difficult if not

impossible to draw firm conclusions concerning the relative strength and importance of each of them. While it is true that the public school system is co-educational while the separate system is not, it is difficult to see how these circumstances would have an important bearing upon academic achievement and career aspiration among high school boys. Accordingly, the data presented below which were gathered by means of a questionnaire have been analyzed in such a manner that religious affiliation and social class background are simultaneously controlled throughout.

While the two types of school system are officially held to be distinct in as much as they theoretically provide services to two different religious communities, it is frequently alleged that the theoretical distinction is violated in practice. Accordingly, it was felt desirable to classify the students comprising the two system samples on the basis of religious preference. The product of this analysis appears in Table II.

TABLE II
RELIGIOUS PREFERENCE BY SCHOOL SYSTEM

	Public School System		Separate School System	
Protestant	89.4	398	0.0	0
Catholic	2.9	13	98.8	238
Jewish	1.7	8	0.0	0
Other	.04	2	0.0	0
No answer	.53	24	1.2	3
Totals	445		241	

It is apparent from this Table that while 1.2 per cent of the separate school system students gave no answer to the question, the remaining 98.8 per cent reported themselves as Catholic. Alternatively, the public school system students included 2.9 per cent who reported themselves Catholics, 1.7 per cent who were Jewish, and 0.4 per cent classified as "Other". Although .53 per cent of the students gave no answer, a total of 89.4 percent reported themselves as Protestant. The very limited number of students who reported themselves as being Jewish made it impossible to treat them as an additional religious category in the analysis of the data. Thus, in order to maximize control of the religious variable, all those who did not report themselves as Protestant as well as those who gave no answer to the question eliciting this information were removed from the sample. The public school system sample, therefore, consists of 398 male Protestant students.

Concerning social class background, previous studies have concluded that such differences as have been found between Catholics

and non-Catholics in respect of academic achievement and career aspirations are attributable to differences in degree of assimilation on the part of more recent immigrants from Catholic countries to the dominant values of the receiving country or, alternatively, to differences in social class positions occupied by Catholics(3). The assumption held by those who reason in this manner is that as assimilation of such recent immigrants proceeds, they will rise in the social status scale. As this occurs through time, the behaviour of Catholics will approximate that of their non-Catholic compatriots and such differences as have been evident historically will disappear. The design of the present study affords an opportunity to test this hypothesis in as much as there is no evidence to suggest that the Catholic populatoin of the City of Calgary can be described as recent immigrants. Their relative proportion of the total population of the Ctity has remained comparatively constant during the past thirty years and as appears in Table III there has been no significant migration of foreign-born Catholics during the period in question. Accordingly, the test of the hypothesis in the present

TABLE III*
CATHOLICS IN THE POPULAION OF CALGARY 1931-1961
BY PROPORTION OF THE TOTAL POPULATION AND
BY NATIONALITY

Proportion of the Total Population Nationality:	1931 %	1941 %	1951 %	1961 %
	12.6	11.7	13.6	19.2
Br. Isles	47.9	48.7	44.3	35.4
French	10.7	11.4	13.3	12.1
German	4.2	4.3	8.8	12.0
Italian	5.2	5.1	5.1	8.7
Jewish	0.0	0.0	0.0	0.0
Netherlands	1.8	1.9	1.8	3.9
Polish	6.3	8.3	7.1	5.8
Russian	1.4	2.0	1.4	1.0
Scandanavian	0.7	0.9	1.3	1.6
Ukrainian	6.2	5.0	3.6	3.4
Other European	14.8	11.2	10.1	13.2
Asiatic	0.2	0.2	0.1	0.2
Other—not stated	0.0	0.3	2.3	1.4
Native	0.0	0.0	0.1	0.0
Negro	0.0	0.0	0.0	0.0

*Source: Decennial Census of Canada 1931, 1941, 1951, 1961.

instance turns upon the issue of class parity between Catholics and non-Catholics. Employing father's occupational class as an index, the relevant data for the two respective samples were classified into seven occupational class categories. This procedure was undertaken in conformity with the canons employed by Blishen in the construction of an occupational scale in which a weighted

combination of education, income and prestige associated with a given range of occupations provides the basis for the scale. The findings are shown in Table IV.

TABLE IV
PUBLIC AND SEPARATE SCHOOL SYSTEMS BY
FATHER'S OCCUPATIONAL CLASS

Class	Public School System					Separate School System	
	School A	School B	School C	Total	N	Total	N
	%	%	%	%		%	
I	7.1	4.5	0.0	4.5	18	8.2	20
II	49.6	41.5	10.9	37.8	150	31.1	75
III	5.8	9.7	3.2	6.7	27	7.8	19
IV	6.5	3.8	7.6	5.7	23	5.3	13
V	15.0	24.0	35.1	23.1	92	19.9	48
VI	8.4	8.4	31.8	13.8	55	11.6	28
VII	5.2	4.5	5.4	5.0	20	5.8	14
Other—							
No answer ...	1.9	3.2	5.4	3.2	13	9.9	24

$X^2 = 9.40 \quad df \ 6 \quad P > .05$

The Table shows that the proportions of students whose fathers fell into the seven occupational classes varied between the three schools representing the public school system sample. The highest two classes are comparatively over-represented in Schools A and B, while the lowest three classes are over-represented in Schools B and C. These differences reflect the socio-economic status of the residential areas in which the respective schools are located. A comparison between the two samples of the total proportions of students whose fathers fell into a given occupational class shows that while the proportion of students in Class I was slightly higher in the separate school sample, that in Class II was slightly lower. Apart from this there is a remarkable uniformity in the class distribution of the two samples. A chi-square test of the significance of these differences was negative. Such differences as do appear are readily attributable to the small size of some of the marginal totals. In general, then, it is clear that there exists a class parity between the two system samples. Since there is no reason to doubt the representativeness of these samples, it follows that it can be concluded that Catholics in Calgary enjoy class parity with non-Catholics. Accordingly, variation in academic achievement and career aspiration found on comparing the two samples can be attributed to differences in religious background. Within each sample, however, it is apparent that social class has a most important bearing upon the behaviour of students.

The first index of achievement to be presented is that of measured Intelligence Quotient. Table V presents a classification of students on this variable by father's occupational class. The Table shows that there is an inverse relationship between social class and average or below average I.Q. and a direct relationship between social class and above average I.Q. Clearly, the student whose father occupies a high occupational class will be exceptionally favoured in his performance on I.Q. tests, while the one whose father is found in a low social class is correspondingly discriminated against. Class I contains nearly three times as great a proportion of students with above average I.Q. as are found in Class VII. The difference is statistically significant at the 0.01 level. Yet it is all too

TABLE V
INTELLIGENCE QUOTIENT BY FATHER'S
OCCUPATIONAL CLASS*

Class	Below Average (90 or less)	Average (91-110)	Above Average (111 or more)	N
	%	%	%	
I	5.5	33.3	61.1	18
II	2.6	29.3	68.0	150
III	7.4	22.2	70.3	27
IV	4.3	34.7	60.8	23
V	10.8	53.2	35.8	92
VI	9.0	60.0	30.9	55
VII	15.0	75.0	10.0	20
Other—No Answer	7.6	61.5	30.7	13
Totals	6.7	42.4	50.7	398

*Complete data availavle for public schools only.
 $X^2 = 55.6$ $df\ 6$ $P<.01$

TABLE VI
ACHIEVEMENT STREAM BY FATHER'S
OCCUPATIONAL CLASS*

Class	Low	Medium	High	N
	%	%	%	
I	11.1	27.7	61.1	18
II	20.0	36.6	43.3	150
III	40.7	44.4	14.8	27
IV	47.8	30.4	21.7	23
V	51.0	29.3	19.5	92
VI	40.0	27.2	30.9	†55
VII	50.0	45.0	5.0	20
Other—No Answer	38.4	30.7	30.7	13
Totals	34.6	33.6	31.4	398

*Data available for public schools only.
†No data available for 1 case.
 $X^2 = 49.6$ $df\ 12$ $P<.01$

TABLE VII
TYPE OF SCHOOL PROGRAM BY FATHER'S OCCUPATIONAL CLASS AND BY SCHOOL SYSTEM*

Class	Public School System					Separate School System				
	Voc.-Tech. †	Com. %	General %	Matric. %	N	Voc.-Tech. %	Com. %	General %	Matric. %	N
I	0.0	0.0	16.6	83.3	18	0.0	0.0	10.0	90.0	20
II	2.6	1.3	10.6	84.6	150	0.0	4.0	6.7	85.3	75
III	11.1	3.7	14.8	66.6	27	0.0	5.3	26.3	68.4	19
IV	8.6	0.0	30.4	56.5	23	0.0	23.1	0.0	69.2	13
V	5.4	6.5	31.5	52.1	92	4.2	8.3	22.9	64.6	48
VI	10.9	1.8	27.2	51.1	55	3.6	7.1	17.9	67.9	28
VII	10.0	0.0	35.0	55.0	20	0.0	7.1	21.4	71.4	14
Other—										
No Answer ...	0.0	0.0	30.7	69.2	13	0.0	8.3	33.3	54.1	24
Totals	5.5	2.5	22.3	68.5	398	1.2	6.6	16.2	73.4	241

*Residual categories not shown.
X² = 52.4 df 6 P < .01

often the case that the student's I.Q. score will have a pre-determining effect upon his future career not only in high school but also in further education and his occupational career.

Table VI classifies students according to their achievement stream by father's occupational class. Here again it is apparent that there is an inverse relationship between social class and medium or low achievement, and a direct relationship between social class and high achievement. A total of 61.1 per cent of the students falling into Class I were rated as high achievers as compared with only 5.0 per cent among those falling into Class VII. Alternatively, with respect to low achievers the corresponding proportions were 11.1 and 50.0 per cent, respectively. Differences are again statistically significant at the 0.01 level. The impact of social class background on academic achievement, therefore, is unmistakable.

An additional index of achievement is to be found in the type of training program in which the student is registered. Table VII classifies students by type of program and father's occupational class. Further, it compares students in the two types of school system. Of the several alternative training programs listed it is clearly the matriculation program which is of prime significance. For it is this program which leads on to further educational and career opportunities such as are obtained only on the basis of advanced training at the university and technical institute. The Table shows that in the public school sample the proportions registered in the matriculation program ranged from a high of 83.3 per cent in Class I to a low of 52.1 per cent in Class V rising again to 55.0 per cent in Class VII. This variation is to some extent governed by the small size of a number of the marginal totals for each class. A similar variation occurs among students in the separate school sample. Here the range is from 90.0 per cent among those in Class I through 64.6 per cent among those in Class V to 71.4 per cent among those in Class VII. These differences are statistically significant at the 0.01 level. Throughout there is a more or less direct relationship between social class and enrollment in the matriculation program. Moreover, a comparison of the two samples shows only negligible differences in the respective proportions enrolled in this type of program. Such differences as there do appear are not statistically significant.

The first index of career aspiration to be considered is that of future occupation. Table VIII classifies the students in the two samples according to father's occupational class as well as the student's personal occupational aspiration. In either sample the proportion of students aspiring to Class I and Class II types of jobs

TABLE VIII
OCCUPATIONAL ASPIRATION BY FATHER'S OCCUPATIONAL CLASS AND BY SCHOOL SYSTEM

Class	Public School System				Separate School System			
	Class of Occupation Preferred*		Class of Occupation Preferred*		Class of Occupation Preferred*		Class of Occupation Preferred*	
	Class I & II	III-IV-V	VI-VII	N	Class I & II	III-IV-V	VI-VII	N
	%	%	%		%	%	%	
I	72.2	5.5	0.0	18	60.0	0.0	0.0	20
II	65.3	17.3	0.0	150	57.3	9.3	2.6	75
III	55.5	18.5	0.0	27	52.6	15.7	0.0	19
IV	47.8	21.7	0.0	23	38.4	30.7	0.0	13
V	46.7	29.3	3.2	92	58.3	22.9	0.0	48
VI	42.7	29.0	3.6	55	46.4	17.8	3.5	28
VII	20.0	50.0	10.0	20	42.8	14.2	0.0	14
Other—No Answer	38.4	23.0	0.0	13	37.5	8.3	0.0	24
Totals	52.0	23.3	1.7	398	52.2	14.1	1.2	241

*Residuals not shown.
 $X^2 = 37.3$ df 6 $P < .01$

varies inversely with social class. In the public school sample the proportions ranged from 72.2 per cent in Class I to a mere 20.0 per cent in Class VII. Among separate school students the corresponding proportions were 60.0 per cent in Class I through a low of 38.4 per cent in Class IV to 42.8 per cent in Class VII. These differences are once again statistically significant at the 0.01 level. Thus while the proportions of students aspiring to Class I and Class II types of occupations were somewhat higher in the four highest social classes among public school students, there was greater uniformity and consistency of choice among separate school students for these same occupational categories. Nevertheless, when the two samples as a whole are compared it is evident that a total of 53.4 per cent of the public school students aspired to Class I and Class II types of occupations as compared with 52.2 per cent of the students in the separate school sample.

These marginal variations are offset to a considerable extent by differences between the two samples in respect of the preferences reported by students for occupations belonging to Classes III, IV and V. One again there is apparent in either sample an inverse relationship between father's occupational class and the proportions of students aspiring to these same occupational categories. In the public school sample the proportions range from 5.5 per cent in Class I through 50.0 per cent in Class VII. In the separate school sample the corresponding proportions were generally smaller and there was less consistent variation. A total of 0.0 per cent of the students in Class I preferred these categories of occupation as compared with 30.7 per cent in Class IV and only 14.2 per cent in Class VII. This difference is not statistically significant.

The proportions of students expressing a preference for Class VI and Class VII occupational categories were negligible in either sample.

Clearly, then, with negligible exceptions students in either sample reported a preference for occupations that stand higher in the socio-economic status scale than those held by their fathers. Such differences as do appear between the two samples are attributable to the small size of the marginal totals, on the one hand, and the failure to respond to the question on the part of a slightly higher proportion of the separate school students, on the other. Thus while occupational preference is markedly influenced by social class, it would be unwarranted to conclude that it is likewise influenced by religious affiliation.

The next index of career aspiration of relevance involves plans to go on to university training. Table IX presents a classification of students in the two samples according to their social class and

TABLE IX
PLANS CONCERNING GOING ON TO UNIVERSITY BY FATHER'S OCCUPATIONAL CLASS AND
BY SCHOOL SYSTEM

Class	Public School System*			Separate School System*		
	Yes %	Undecided %	No %	Yes %	Undecided %	No %
I	83.3	5.5	11.1	90.0	10.0	0.0
II	72.0	14.0	14.0	73.3	10.7	14.7
III	62.9	11.1	25.9	63.2	21.1	15.8
IV	43.4	34.7	21.7	30.8	30.8	38.5
V	32.6	25.0	41.3	45.8	20.8	31.3
VI	32.6	25.0	41.3	50.0	14.3	35.7
VII	15.0	30.0	55.0	42.9	21.4	35.7
Other—No Answer	46.1	32.0	30.7	54.1	16.6	20.8
Totals	52.0	19.8	28.6	59.8	16.2	22.4
						241

*Residuals not shown.
 $X^2 = 85.5$ df 6 $P < .01$

disposition regarding enrollment at university. The familiar inverse relationship between social class and plans to attend or definitely not attend is once again in evidence. Differences attributable to social class are once again significant at the 0.01 level. In the public school sample the proportions planning to go on to university training range from 83.8 per cent in Class I through 15.0 per cent in Class VII. In the separate school sample the corresponding proportions were 90.0 and 42.9 per cent, respectively. Conversely, the proportions of students in either sample who definitely do not plan to go on to university training varies directly with social class. In the public school sample the proportions range from 11.1 per cent in Class I to 55.0 per cent in Class VII. In the separate school sample none of the students in Class I were definitely not planning to go to university as compared with 35.7 per cent of those in Class VII.

The profound influence of social class background on aspirations to go on to university training is once again unmistakably clear. Concerning the influence of religious affiliation, however, the evidence is somewhat more equivocal. A slightly higher proportion of separate school students than public school students planned to go on to university training. The relevant values were 59.8 per cent and 52.0 per cent, respectively. Conversely, a smaller proportion of separate school than public school students definitely planned not to go on to university training. In this instance the relevant proportions were 22.4 per cent and 28.6 per cent, respectively. Thus, within the limits of sampling variation it would appear that separate school students had, in the overall sense, a higher level of aspiration than did their public school counterparts. Differences attributable to religious influence, however, are once again without statistical significance.

From the standpoint of career aspiration, however, plans to attend or not attend university are only part of the larger issue. Equally important is the question of what field of training will be entered at university. Table X presents a classification of the students in either sample by father's occupational class and by field of study planned at university. The Table shows that the "Other Professions" category is by far the most frequently reported in both samples. The reference here is to such professional fields as business, engineering, agriculture, medicine, etc. Further, the frequency of those choices varies more or less inversely with social class. Differences are once again significant at the 0.01 level. Among public school students the relevant proportions ranged from 66.6 per cent in Class I through nil per cent in Class VII. Among separate school students there was a greater uniformity of choice

TABLE X
FIELD OF STUDY PLANNED IN UNIVERSITY BY FATHER'S OCCUPATIONAL CLASS AND
BY SCHOOL SYSTEM

Class	Public School System*			N†	Liberal Arts			Separate School System*			N†
	Liberal Arts %	Science %	Other Professions %		Liberal Arts %	Science %	Other Professions %	Science %	Other Professions %	Education %	
I	12.5	6.2	75.0	16	5.5	5.5	44.4	5.5	44.4	0.0	18
II	4.8	21.9	44.7	123	6.7	10.1	57.6	10.1	57.6	3.3	59
III	5.5	22.2	38.8	18	0.0	13.3	33.3	13.3	33.3	20.0	15
IV	12.5	6.2	56.2	16	0.0	42.8	28.4	42.8	28.4	14.2	7
V	2.2	20.4	52.2	44	3.3	13.3	50.0	13.3	50.0	13.3	30
VI	0.0	13.3	50.0	30	11.7	23.5	41.1	23.5	41.1	5.8	17
VII	0.0	33.3	0.0	6	0.0	0.0	42.8	0.0	42.8	14.8	7
Other—											
No Answer	30.0	20.0	40.0	10	13.3	20.0	40.0	20.0	40.0	20.0	15
Totals	4.5	19.0	47.5	263	5.9	13.6	47.6	13.6	47.6	8.9	168

*Residuals not shown.

†Percentages based on the total number who plan to attend university only.

$X^2 = 20.38$ df 6 $p \leq .01$

between students in different social classes. The relevant proportions in this instance ranged from 40.0 per cent among those in Class I through 21.4 per cent among those in Class VII. Again the relationship between social class and preference for these fields of training was not entirely uniform. Furthermore it is evident that a slightly larger proportion of separate school students than public school students chose these categories. The relevant values were 33.1 per cent and 30.3 per cent, respectively.

By contrast the "Liberal Arts", "Science" and "Education" training categories show little influence of social class and were given an extremely limited number of choices in either sample. Among public school students the proportions planning university study in these fields were 3.0, 12.5, and 3.2 per cent, respectively. In the separate school sample the corresponding proportions were 4.1, 9.5 and 6.2 per cent, respectively. Thus, while there were slightly higher numbers of public school students than separate school students planning to go into science, fewer of them planned to study Liberal Arts and Education. These differences, however, are again without statistical significance.

These findings give no support whatever to the traditional view that Catholics tend to avoid science because of a conflict between its demands and those of religious faith. On the contrary, the evidence reviewed above suggests that Catholics are not at present any more nor less rationalistic and materialistic in their career aspirations than are Protestants.

Discussion

Having reviewed the data relating to academic achievement and career aspiration, their implications for the hypothesis that differences in social class background and differential religious affiliation are equally important can now be assessed.

Concerning the influence of social class background on the behaviour in purview the data leave little room for doubt. In each and every instance in which data bearing upon achievement and aspiration were analyzed by reference to social class, significant differences were disclosed. On all indices of achievement and aspiration favourable to advancement and worldly success an inverse relationship with social class was in evidence. The implications for a democratic society in an age of the atom and the computer stemming from this state of affairs is perhaps already too well known to require reiteration here. (4) That those students in the lower ranking social classes are under-privileged and suffer systematic discrimination in the competitive race for wealth, status and power is abundantly clear. Whether modern society can long

continue to ignore this form of social inequality or whether it can realistically afford the consequent wastage of human potential is less immediately apparent. The data presented provide no answers to these vexing questions. In any event such an inquiry lies outside the scope of the present paper.

Concerning the influence of different religious affiliation the evidence presented is wholly negative in its implications. There appear to be no significant differences in achievement and career aspiration between the two samples. The question consequently arises as to whether religion is entirely without influence on these issues. The data presented do not permit a direct conclusion concerning this matter. The findings, taken as a whole, however, do strongly suggest that while the historic differences between Catholics and non-Catholics in doctrine and dogma tend to remain, the actual difference in religious socialization and its impact upon behaviour relating to academic achievement and career aspiration is fast disappearing. To what extent the disappearance of these differences is linked to general social change in society and to what extent they arise out of the changing position of Catholics in the social class structure cannot be determined from the data presented here. At a minimum the answer to this question would necessitate a comparative inquiry into the practice of the faith among the adherents of all religious communities now as well as in the past. Impressionistic evidence strongly suggests that important shifts and changes have occurred in recent decades in the practice of the faith, particularly among Catholics. Only further specific research, however, can hope to establish the validity of this observation.

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1. Catholics in the Province of Alberta have been granted the right to organize and administer their own separate educational system. But while the organization of both public and separate school systems is discrete at the local level, the content of training in both elementary and high schools, is controlled by the Provincial Department of Education. Thus, apart from religious instruction and observances, such matters as text-books, curricula, teacher education and certification standards, are uniform and common to both systems. Furthermore, both systems prepare students to compete in common province-wide matriculation examinations at the end of Grade XII.
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PROGRAMMED INSTRUCTION IN MUSIC FUNDAMENTALS

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J. D. AYERS

Introduction

*The musician may sing to you of the rhythm which is in all space,
But he cannot give you the ear that arrests the rhythm or the
voice that echoes it!*

For the vision of one man lends not its wings to another man.

(The Prophet)

Whether or not they accept the truth of Kahlil Gibran's Prophet, music educators forever attempt to devise new means of awakening dawning talent and love for music in their small charges. One of the problems which perennially plagues these educators (and educators in all disciplines) is that of bringing a class to a relatively homogeneous level of competence in a limited amount of instruction time. Therein lies one of the great potential values of programmed instruction. It is with this in mind that the present study was undertaken.

Purposes of the Study

This study was designed to evaluate the effectiveness of a program in music fundamentals given to grade seven students of limited musical background. The program, *Fundamentals of Music* (1), was given first trial by a group of 42 undergraduate elementary education students at Ohio State in 1962 (2). These students were divided into two groups and matched with respect to scores on a pretest and musical background. Procedures for the two groups included instruction in music fundamentals. In addition, the experimental group used the program. Results of post-tests were as hypothesized.

From this study Barnes concluded that use of the program was an effective means of learning basic fundamentals of music, regardless of achievement level or musical experience. Whether or not the conclusion is valid, it is doubtful that one can logically infer it from the study reported by him. Insofar as use of any program merely as an ancillary learning experience outside of regular class time provides a direct need to spend time studying course content, any increase in level of performance can just as reasonably be attributed to the extra time spent studying as to the specific program used. Furthermore, although Barnes asserts that the Hawthorne effect could not account for increased performance since the group

was not aware that this was an experiment, it is also reasonable to argue that the Hawthorne effect cannot be discounted in as much as the experimental group subjects were told that they were not to discuss the program with other students because they were the only ones using it.

The Problem

In order to establish more clearly the usefulness of this program, a study was undertaken at the University of Alberta, Edmonton, in the winter of 1964-65. The study was designed specifically to test the hypothesis that grade seven students in a beginning instrument class could overcome the limitations of their musical background in a short period of time when they used the program for music fundamentals. A second hypothesis was that knowledge of music fundamentals would also increase as a result of incidental learning in connection with learning to play an instrument.

Method

Subjects

The total group of 84 grade seven students from the university's Music Education Laboratory (MELAB) was chosen for the study. These students met for class and band practice twice weekly, from 5:00 to 7:00 Wednesday afternoons, and from 9:00 to 12:00 Saturday mornings. Eight of the students were dropped from the experiment leaving thirty-eight in each of two groups. Background information was obtained from files that had been prepared earlier in the fall.

Materials

The *Fundamentals of Music* program developed by Robert Barnes was used with the experimental group of thirty-eight students. These students were divided first on the basis of musical background and administered a pre-test (hereafter referred to as Form A) consisting of 50 completion-type items dealing with those aspects of music fundamentals covered by the program. The form and content of the test were very similar to that of the criterion questions given at the beginning of each of the ten units which comprise the program, thus assuring content validity. A post-test containing 50 analogous but not identical items was administered to all students upon completion of the program (Form B). Form A of the test was re-administered three weeks later to give a measure of retention. Data concerning reliability of the forms is given in Table I.

Procedures

Two groups of students were formed on the basis of total number of years of previous music lessons. Students with no more than one

year of background were designated as the experimental group. Those with more than one year of music background served both as control group and as experimental group in the sense that any incidental learning occurring during the twelve weeks that it took for completion of the program would be reflected in an increase of their scores from pre-test to post-test.

The pre-test mean difference for the two groups was ample evidence that music background differentiated the two groups with respect to knowledge of music fundamentals (Table III). The difference of slightly more than 11 points between the two means was found significant as expected. The first hypothesis postulated a significant decrease in mean difference. The second hypothesis predicted an increase in the control group mean as a result of incidental learning.

Treatment of both groups was identical on Wednesdays and during the first and last hour on Saturday when the groups met for band practice and instruction. During the second hour of every Saturday class, however, the experimental group members were given the program while the control group listened to recorded music in an 'appreciation' class—an activity which could not conceivably improve their performance on tasks involving music notation. Experimental group subjects were not given instructions in music notation but worked on their own and at their own speed using only the program. Progress of each member was checked periodically by the instructors in order to determine when to administer Form B of the test. While Barnes found that six hours was usually ample time for university undergraduates to complete the course, it was not surprising that most members of this grade seven group required twelve hours. At the end of twelve weeks the post-test was administered, and, three weeks later, Form A was given as a retention test.

Test Reliability

Before test results could be interpreted with any degree of certainty, an estimate of the reliability of each form as well as of the equivalence of the two forms had to be computed.

An estimate of equivalence is given by the L_{mev} statistic (Johnson and Jackson) which, in one operation, determines the equivalence of the means and variances of two forms of a test. Using this statistic the means and variances were found not to differ at the .05 level ($L_{mev} = .8472$; $N = 38$; $P > .05$).

Measures of internal consistency were computed for both forms using the Kuder-Richardson 21 formula, and are given in Table I. These are close approximations of split-half reliability coefficients

under the assumption that all items are homogeneous with respect to what they measure—an assumption which can be accepted as valid for these two forms. Given these coefficients and results of the L_{mcv} tests, it was concluded that the two test forms were satisfactorily reliable and equivalent.

TABLE I
K.R. (21) MEASURES OF INTERNAL CONSISTENCY

Group	K.R. (21) Coefficient
Form A Experimental	.88
Control	.79
Form B Experimental	.81
Control	.63

Results

Scores on the pre-test (Form A), the post-test (Form B) and the retention test (Form A) for both groups of thirty-eight students are summarized in Table II below, and presented graphically in Figure 1. cursory examination of these results indicates support of the second hypothesis—that the pre-test group would ‘learn’ incidentally. A test of the significance of change from pre-test to post-test for the control group did, in fact, support the hypothesis (Table III).

TABLE II
SUMMARY OF RESULTS

	Means		Variances	
	Exp.	Control	Exp.	Control
Pre-test—A	11.76	22.87	57.97	56.82
Post-test—B	22.24	28.34	60.69	32.46
Retention—A	23.05	28.90	89.73	54.86

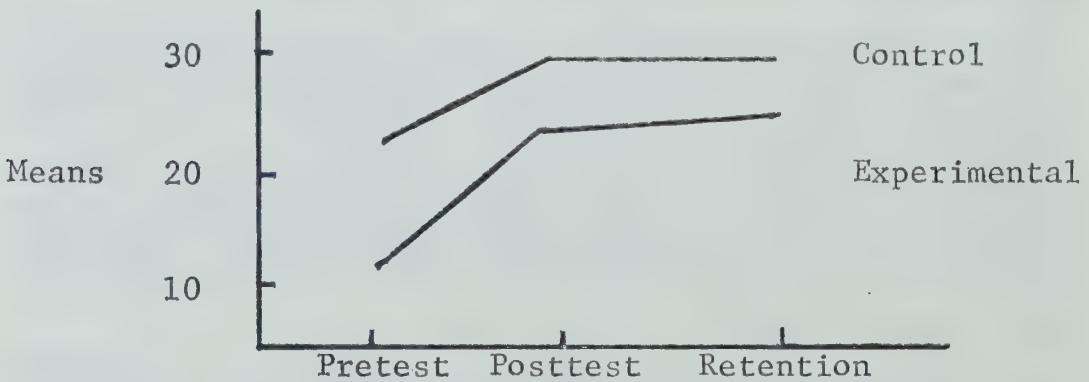


FIGURE 1
Group Means

The second hypothesis—that experimental group subjects would overcome the limitations of their musical background through use of the program—was not so readily supported. Both experimental and control group subjects gained significantly, but both were exposed to the same incidental learnings. Support of the hypothesis would require that the experimental group gain more than the control group. That this was the case was determined by pooling error variances for separate group gains and calculating a 't' which was the ratio of the difference in gains to the square root of pooled error variances (Table III). Even though the control group still scored significantly higher than the experimental group on the post-test, it had not gained as much. Retention-test scores did not differ from post-test scores for either group.

TABLE III
TESTS OF GAINS AND MEAN DIFFERENCES OF CONTROL
AND EXPERIMENTAL GROUPS

	Experimental Mean	Control Mean	Difference	t	P
Pre-test	11.76	22.87	11.11	6.31	<.01
Post-test	22.24	28.34	6.10	3.86	<.01
Gain	10.48	5.47			
t	10.48	7.20			
P	<.01	<.01			
Difference in gain ...	5.01				
t	3.98				
P	<.01				

Summary and Conclusions

Results of the study supported the two hypotheses: the experimental group performed significantly better on the post-test after twelve weeks of programmed instruction and the control group also gained, presumably as a result of incidental learning. The effects of incidental learning were subtracted from total gains for the experimental group. No significant loss or improvement occurred over the three weeks following the post-test.

This study can be interpreted as additional support for the contention that programmed instruction can not only save time for the teacher and the students, but can also allow the teacher to assume a specific level of competence on the part of almost every student in a beginning class. It is also further evidence of incidental learning of music fundamentals through learning an instrument. It

must be admitted, however, that the level of performance reached by the students on any of the tests is not as high as would ordinarily be expected after programmed instruction. An unlikely explanation would be that this is a reflection of the difficulty of the tests—unlikely because the tests closely parallel criterion questions in the programmed text. The next logical step is to offer as explanation the notion that the program is too difficult for grade seven students since it was developed for and tried out with college undergraduates. This again is not very plausible. Inspection of program content, pace, and communication level does not support the explanation. It is considerably more likely that the full week which elapsed between each exposure to the program contributed to more inefficient and ineffectual use of the material than would have been the case had it been covered in a shorter period of time. Further study under more ideal conditions would undoubtedly provide added evidence of the value of this program for beginning students in music education—and perhaps teachers as well.

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EDUCATIONAL AND OCCUPATIONAL ASPIRATIONS AMONG RURAL AND URBAN MALE ADOLESCENTS IN ALBERTA

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Sociologists have long noted basic differences in value orientations and attendant attitudes between people from rural and urban communities. Tonnies "*gemeinschaft-gesellschaft*" typology is perhaps best known (1). *Gemeinschaft* or rural communities are typified by a degree of social integration which demands strong personal commitment from its members. Such a community, while tending to produce an emotionally secure and stable individual, also tends to produce an adult strongly committed to the customs, traditions, and values of the community. By way of contrasts *gesellschaft* or urban communities are typified by a much more impersonalized, rational network of social relationships, where-in integration is predicted upon functional relationships. Consequently, individuals raised in such a community will display more rational autonomy in their relationships within and commitment to the community as such.

Manifestation of value orientations toward education are generally expressed in terms of the level of aspiration regarding the amount of education desired. Such aspiration, which may be defined as one's attitude toward education, is highly influential in the amount of motivation a student has to "succeed" in the school system. Its importance, therefore, in terms of academic performance cannot be minimized (2).

A second and, perhaps, equally important factor in the expression of value orientations emerges from the increasing affiliation of formal education to vocational choice. Modern youths' attitude toward occupations held in high regard by the society of which he is a member is being rapidly circumscribed by the requirement of an extended training only available within formal education. Thus, regardless of his attitude toward education itself (or perhaps in spite of it), his desire to succeed in his schooling may be predicated upon his aspiration to attain a particular vocation. Occupational aspiration then becomes a second key element in academic motivation for the student.

Taken together, educational and occupational aspiration would seem "a priori" to account for a sizeable proportion of the variance in academic motivation.

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Applying such differences to students in contemporary education, we would anticipate that students from rural communities, bound to a greater extent by the custom and values of an earlier generation, would tend to limit their educational and occupational aspirations (3). Conversely, students from urban communities, unfettered to the same extent by such commitments, should tend to aspire to higher educational and occupational goals.

Research efforts in the United States lend support to our reasoning. Studies by Grigg and Middleton in Florida (4), Burchinal in Iowa (5), and Haller and Sewell (6) in Wisconsin found urban high school boys having higher educational aspirations than rural high school boys. In both the Florida and Wisconsin studies, this relationship held with intelligence controlled. In all studies, except Haller and Sewell's, the same relationship obtained for occupational aspirations. The evidence then, at least for the United States, is consistent with our theoretical expectations.

A confounding factor in this relationship between educational and occupational aspirations and rural-urban origins is that of social status. As early as 1949 Hollingshead, in his classical "Elmstown" Study found that educational and occupational aspirations of adolescents were directly related to their social status origins (7). Youman's study of the educational and occupational aspirations of Michigan male adolescents supports Hollingsheads' findings (8), as do studies by Kahl in the Boston area (9), Stephenson in New Jersey (10), and Empey in Washington State (11). Sewell, Haller and Strauss report similar relationships among Wisconsin youth (12). In effect, all these studies report a significant positive relation between social status and educational and occupational aspirations.

Canadian studies in this area are limited. Most directly, Belanger in a study of grade seven children in Quebec found that a positive relationship existed between educational aspiration and social class (13). Indirect support for the American findings is reported by Knill from a study on vocational aspirations of Metis-Indian and White children in northern Saskatchewan (14). He found that the level of Metis-Indian occupational aspiration was somewhat lower than that of the White boys. Although cultural differences are important here, it is also true that the vast majority of Metis-Indian children would be classified as rural and from lower social status origins.

From the preceding discussion of predominantly American research in this area strong support is garnered for the hypothesis that educational and occupational aspirations are related to the rural-urban and social status origins of male high school students.

Do such relationships hold in Canada, however? We hypothesize that they do.

For our study data were collected in the spring of 1965 from the entire male population in the tenth, eleventh, and twelfth grades in a rural and an urban high school in southern Alberta. The original sample for both schools combined was 214 subjects. (Seventy-five from the rural school and 139 from the urban school.) Incomplete or non-intelligible questionnaires reduced the total number to 184 (71 from the rural school and 113 from the urban school).

The rural school was located in a small community of approximately 3,200 population. Situated over 100 miles from the nearest metropolitan centre, it serves as both the economic and social centre for farmers and their families in the surrounding area. The urban school, located in a large metropolitan center of over 300,000, served primarily a working class section of the community. While middle and upper class students were found in the school, the majority of subjects in the urban school were from working class families.

The instrument, administered *en mass* at each school, consisted of a questionnaire which included (a) a question on the father's occupation (used subsequently for assigning the subject a social status score) (15), (b) questions on the extent and type of future education desired by the subject (16), (c) the Occupational Aspiration Scale developed by A. O. Haller and I. W. Miller (17).

Results

Table I indicates the results of an analysis of variance of the mean educational aspiration scores obtained, controlling for status differences and rural-urban origins (18).

TABLE I
MEAN EDUCATIONAL ASPIRATION SCORE BY RURAL OR URBAN ORIGIN, SOCIO-ECONOMIC STATUS CONTROLLED

Socio-Economic Status	Urban	Rural
High	52.800 (N=55)	51.500 (N=36)
Low	49.051 (N=58)	48.057 (N=35)
Analysis of Mean Variance		
Community of Origin	$F_{0(1, \infty)} = .6204 < F_{t.05(1, \infty)} = 3.84$	
Social Status	$F_{0(1, \infty)} = 7.3967 \geq F_{t.05(1, \infty)} = 3.84$	
Interaction	$F_{0(1, \infty)} = .1005 < F_{t.05(1, \infty)} = 3.84$	

As will be noted, while rural-urban origins have no significant status is influential in terms of occupational aspiration. It would appear that regardless of the subject's community of origin, high social status is associated with high educational aspiration.

TABLE II
MEAN OCCUPATIONAL ASPIRATION SCORE BY RURAL OR URBAN ORIGIN, SOCIO-ECONOMIC STATUS CONTROLLED

Socio-Economic Status	Community of Origin	
	Urban	Rural
High	51.218 (N=55)	51.944 (N=36)
Low	48.120 (N=58)	51.914 (N=35)

Analysis of Mean Variance		
Community of Origin	$F_{0(1, \infty)} = 2.2135 < F_{t.05(1, \infty)} = 3.84$	
Social Status	$F_{0(1, \infty)} = 1.6887 < F_{t.05(1, \infty)} = 3.84$	
Interaction	$F_{0(1, \infty)} = .9076 < F_{t.05(1, \infty)} = 3.84$	

In Table II it is seen that neither community of origin, nor social status is influential in terms of occupational aspiration. It would appear that the findings in the case of occupational aspirations are totally inconsistent with those reported in earlier American studies.

Summary and Discussion

An analysis of rural-urban and social status influences upon occupational and educational aspirations among rural upper and lower status and urban upper and lower status male adolescents in southern Alberta indicates that there is no significant difference between them in terms of occupational aspirations. Significant differences between upper and lower status subjects do obtain, however, in educational aspiration for both rural and urban male adolescents. No significant rural-urban differences in educational aspirations were found.

While the nature of our data and the size of our sample precludes generalizations to the broader adolescent group in Alberta or in Canada generally, it is reasonable to infer certain implications from the result obtained in this study. First, it appears that social status is a far more important determinate of educational aspiration than is rural or urban origin. Why this should be so is not clear, for certainly the rural tradition in southern Alberta is a well established and commonly accepted one. One would anticipate that such a tradition should be instrumental in reducing the aspirations,

both educationally and occupationally, of rural youth. Such, however, does not seem to be the case. Several reasons may exist to explain this. Mass communications has been a significant factor in contemporary Canadian society. The old idea of the isolated rural community simply does not appear to be germane to contemporary Canadian society, at least as far as southern Alberta goes. Additionally, in the recent years the Provincial Government in Alberta has attempted to implement an educational foundations program aimed specifically at rural youth. While it is not possible to claim a direct relationship between this program and increased educational-occupational aspirations of rural youth, it is reasonable to assume that some positive consequence, in terms of aspirations, would logically follow from such an educational foundations program.

It is also possible, however, that similarities in our samples are not so much a function of higher educational and occupational aspirations among the rural youth, but rather of the low aspirations found in the particular urban school chosen for purposes of comparison. It will be remembered that the school chosen was from a working-class area. Whether or not schools which are found in middle- and upper-class areas of the city would have the same type of student population, in terms of educational and occupational aspirations, is an interesting question for which, unfortunately, our data does not furnish an answer. It is obvious that in order to clarify this relationship, further research must be done, utilizing urban schools from middle- and upper-class residential areas as points of comparison to the rural school itself.

A second implication worthy of further investigation rests upon the non-significant results, which are contrary to studies done in the United States. Is this because of cultural differences between the U.S. and Canada? While we may only speculate, Downey's study of regional variations within the U.S., and between the U.S. and Canada regarding the role of education would suggest that such differences could exist(19). Further, the logical extension of Lipset's analysis of Canadian-American differences to educational and occupational aspirations would support the idea that urban Canadian students were less mobile, occupationally, than urban American students(20). Such variations across cultures have never been systematically explored and appear potentially fruitful in understanding Canadian Society.

Social status or class seems to be the important variable in terms of its effect upon educational aspirations. We may speculate that the very factor of increased exposure to a variety of occupational choice influences all classes. In other words, the mere fact that one

knows of the existence of various high-level occupations may act as an elevator of occupational aspirations. However, knowledge of the occupation does not necessarily mean equal knowledge of its educational requirements. Therefore, the difference which is found in terms of social class origins and educational aspiration may be a function of the limited knowledge of lower-status students about educational requirements and how these requirements are related to occupational achievement. One would hypothesize, that based upon the results obtained in our study, there is little relationship between the level of occupational attainment desired and knowledge of the educational requirements for that occupation. Certainly Knill, in his study of northern Saskatchewan students, points out the discrepancy between desired occupations and the necessary facilities available (21). We would go one step further, and suggest that the high occupational aspirations can be held by students who are ignorant or lacking an appreciation for educational facilities which are available and necessary to fulfill their aspirations.

For the subjects in this study, insofar as occupational and educational aspirations are indicative of academic motivation, social status seems to be the only significant indicator of differences in motivation. And this is true only for educational aspiration. It is possible, of course, that the instruments used were not sufficiently sensitive to identify differences which may exist. On the other hand, these instruments are the same used by several investigators in the United States where significant differences were reported. Accordingly, other factors must be considered. As suggested above, the possibility of true cultural differences between American and Canadian adolescents has never really been explored. Certainly, differences in the proportion of high school "dropouts" in the two societies could be due as much to differences in student attitudes toward education, as it is to differences in the educational systems of the two societies. Downey's study suggests as much.

It would seem, that for this small sample of Albertan male adolescents occupational aspirations are evenly distributed. Educational aspirations, however, are not evenly distributed, and this in the final analysis could prove more of a problem for modern Canadian Society than if the same differences obtained in occupational aspirations that obtains in educational aspirations. For if adolescents are committed to high occupational aspirations but are unfamiliar, by and large, with what is required educationally to attain these occupations, or are effectively discouraged from utilizing them, a period of disillusionment must inevitably ensue. This disillusionment could account, in part, for the high proportion of educational dropouts in Canadian Society.

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A COMPARISON OF THE EFFICIENCY OF THE AVERAGE AND INDIVIDUALLY WEIGHTED GRADE XII DEPARTMENTAL AND PRINCIPAL'S RATING SCORES TO PREDICT UNIVERSITY FRESHMAN SUCCESS*

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Research has shown that high school average constitutes the best single predictor of freshman success (Clarke, 1958; Henry, 1950; Garrett, 1949; Travers, 1949, Evenson and Smith, 1958; Mack, 1963). The high inter-correlations of the predictor variables used in the two earlier articles of this series‡ suggest that the Grade XII average might be as efficient a predictor as multiple regression. Since it is suspected that the reliabilities of the Grade XII scores are comparatively low it can be argued that the combination of these scores into a single score would, by lengthening the test basis, improve the reliability of the score. If this is so the improved reliability could offset the loss in predictive efficiency resulting from ignoring the differential contributions of individual scores of lower reliability, because the unique contribution of any one specific score after the high common variance of any one single other score is removed will be relatively small. In Table I the inter-correlations of the predictor variables for the total sample using the five Grade XII Departmental scores to predict University Freshman success are shown. These were reported in the second articles in this series.

TABLE I
INTER-CORRELATIONS OF PREDICTOR AND CRITERION
VARIABLES FOR 1,017 FRESHMAN USING
GRADE XII DEPARTMENTAL SCORES

	1	2	3	4	5	6
1. English 30		.439	.230	.341	.457	.417
2. Social Studies 30			.406	.555	.409	.488
3. Mathematics Average				.630	.344	.401
4. Science Average					.456	.546
5. Foreign Language Average						.459
6. University Average						
R = .636						

*This is the fourth in a series of six related articles considering the problems of predicting freshman success at the University of Alberta, Edmonton.
‡This *Journal* Vol. XI, No. 2 pp. 71-82 and pp. 125-133.

The data in Table I shows that the highest zero-order correlation coefficient with the criterion is .546 while the multiple correlation coefficient is .636. The smallest inter-correlation coefficient of the predictor variables is .230 and the largest is .630, with the median coefficient about .42. In general terms, a large part of the variance is common to each of the Departmental scores which in turn is reflected in the rather homogeneous size of correlation coefficients between each of the Departmental scores and the criterion.

The study reported in this article was conducted to compare the effectiveness of predicting freshman success at the University by using two methods: (1) differential prediction using the individual Grade XII scores, and (2) a single predictor, the Grade XII average. The comparison used two groups of predictor variables: first, the reported scores from the Grade XII Departmental examinations; and second, the Grade XII Principals' Rating scores. The multiple correlations have been reported earlier by Knowles and Black in the second and third articles of this series. The Grade XII averages were calculated for each subject in the same sample from which the multiple correlation coefficients were calculated. Further, the breakdown of this sample by size of graduating high school, sex, and faculty entered at the University established in the second articles of this series has been followed. The Grade XII Average means and standard deviations of each group are reported in Table II for both Departmental and Principals' Rating scores. Table III reports the means and standard deviations of the University Freshman averages for the various groupings of the sample.

Table II confirms earlier findings that in the thirty-nine subgroups of the sample, no instances were found in which Principals' Rating Grade XII Average was numerically higher than the Departmental Average. In all but two instances, where male and female comparisons were made, the averages of female freshmen were numerically higher than those of male freshmen. In terms of Departmental Averages, both male and female averages from large high schools (i.e., those with 26 or more teachers) were significantly higher than those of students graduating from small high schools. Principals' Rating averages, with the exception of female graduates from large high schools, were within one quarter of a point of one another. Female students from large high schools had significantly higher Principals' Rating averages than the other three groups. In terms of faculties, mean high school averages numerically ranked from highest to lowest were Science, Engineering, Arts and Education in that order for both Departmental and Principals' Rating score averages.

TABLE II
MEANS AND STANDARD DEVIATIONS OF GRADE XII DEPARTMENTAL AVERAGE SCORE AND
PRINCIPALS' RATING AVERAGE IN FOUR FACULTIES BY SEX AND SIZE OF GRADUATING
HIGH SCHOOL

Faculty	Small High Schools				Large High Schools				Total		
	Male		Female		Male		Female		Male	Female	Total
	N	$\bar{X}$	N	$\bar{X}$	N	$\bar{X}$	N	$\bar{X}$			
Arts Dept. Gd. Prin. Rat.	61	68.41	59	71.25	120	69.81	76	72.48	136	119	256
									68.21	71.87	69.91
									6.55	8.45	7.70
									65.66	69.50	67.45
									7.57	9.38	8.66
Education Dept. Gd. Prin. Rat.	80	65.79	228	67.18	308	66.82	26	68.31	90	292	398
									65.75	67.43	66.98
									5.31	6.33	6.11
									63.48	66.37	65.60
									7.25	7.51	7.54
Engineering Dept. Gd. Prin. Rat.	59		1		60	70.20	42		42	1	102
									71.38		70.69
									7.60		7.00
									68.52		68.92
									7.43		7.45
Science Dept. Gd. Prin. Rat.	107	69.80	22	73.91	129	70.50	109	72.29	132	45	261
									73.16	75.62	71.85
									8.77	8.47	8.91
									69.21	74.62	70.15
									9.51	8.59	9.57
Total Dept. Gd. Prin. Rat.	307	68.46	310	8.31	617	68.38	253	70.18	400	457	1,017
									69.22	69.28	69.25
									7.66	7.67	7.58
									67.20	68.01	67.44
									8.59	8.52	8.47

TABLE III
MEANS AND STANDARD DEVIATIONS OF UNIVERSITY FRESHMAN AVERAGES IN FOUR FACULTIES BY SEX AND SIZE OF GRADUATING HIGH SCHOOL

		Small High Schools			Large High Schools			Total		
		Small High Schools			Large High Schools			Total		
Faculty		Male	Female	Total	Male	Female	Total	Male	Female	Total
Arts	$\overline{N}$	61	59	120	76	60	136	137	119	256
	$\overline{x}$	58.48	63.27	60.83	59.97	65.08	62.23	59.31	64.18	61.57
	s	9.89	7.52	9.09	9.29	9.92	9.87	9.56	8.82	9.52
Education	$\overline{N}$	80	228	308	26	64	90	106	292	398
	$\overline{x}$	57.54	60.39	59.65	59.96	61.64	61.16	58.13	60.66	59.99
	s	7.95	7.69	7.85	6.41	9.29	8.56	7.65	8.07	8.02
Engineering	$\overline{N}$	59	1	60	42	-	42	101	1	102
	$\overline{x}$			56.90			58.33			57.49
	s			13.23			13.04			13.10
Science	$\overline{N}$	107	22	129	109	23	132	216	45	261
	$\overline{x}$	60.95	62.91	61.29	62.98	69.78	64.17	61.98	66.42	62.74
	s	11.50	9.75	11.21	13.38	11.62	13.30	12.50	11.18	12.37
Total	$\overline{N}$	307	310	617	253	147	400	560	457	1,017
	$\overline{x}$	58.71	60.86	59.95	61.00	64.32	62.22	59.82	62.09	60.68
	s	10.84	7.87	9.54	11.72	10.27	11.31	11.26	8.91	10.33

TABLE IV
MULTIPLE CORRELATIONS OF FIVE GRADE XII DEPARTMENTAL SCORE VARIABLES AND
ZERO-ORDER CORRELATIONS OF GRADE XII DEPARTMENTAL SCORE AVERAGE AND
UNIVERSITY FRESHMAN AVERAGE IN FOUR FACULTIES BY SEX AND SIZE OF GRADUATING
HIGH SCHOOL

Faculty		Small High Schools			Large High Schools			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Arts	N	61	59	120	76	60	136	137	119	256
	R	.444	.693	.546	.733	.826	.783	.558	.746	.653
	r	.398	.652	.529	.649	.824	.755	.534	.758	.660
Education	N	80	228	308	26	64	90	106	292	398
	R	.495	.635	.586	.640	.651	.645	.470	.634	.596
	r	.357	.567	.522	.565	.641	.632	.393	.590	.553
Engineering	N	59	1	60	42	-	42	101	1	102
	R			.732			.831			.750
	r			.609			.730			.661
Science	N	107	22	129	109	23	132	216	45	261
	R	.632	.621	.625	.799	.909	.818	.722	.796	.737
	r	.623	.616	.621	.795	.908	.817	.727	.792	.742
Total	N	307	310	617	253	147	400	560	457	1,017
	R	.555	.610	.560	.718	.791	.735	.635	.679	.636
	r	.537	.580	.545	.728	.791	.748	.640	.683	.649

The same patterns hold only in part for the University average. The students from large high schools did better than their counterparts from small high schools, and female performances were higher than male performances. However, the patterns reported earlier for rank standings indicate the highest average performances in the Faculty of Science, the lowest in Engineering, and very little differences between Arts and Education, although the numerical advantage does favour Arts. It is of interest to note again, that the strong appeal of Education for students from small high schools which are chiefly found in the rural areas, and the avoidance of this Faculty by students from large high schools is apparent. Of every four students in Education, three are from small schools. Compare this to each of the other three faculties where the proportion of students from large and small high schools is about equal.

The multiple correlation coefficients and the zero-order correlation coefficients between the criterion and Grade XII Departmental and Principals' Rating scores are reported in Tables IV and V, respectively. The multiple correlation coefficients are those reported in the two preceding articles in this series. In both Table IV and V, no instance is found where a difference between the two correlation coefficients for Departmental scores was statistically significant. Of thirty-nine comparisons, only nine differences of five (.05) correlation points or more were found of which only three were ten or more points. Of these latter three "large" differences, all were in Engineering. For the Principals' Ratings, eleven differences exceeding five correlation points were found of which only two exceeded ten points (.14 and .16 for correlations with N's of 26 and 24, respectively). Except in extreme cases, it is not likely that the standard error of estimate for most predictions of freshman success will differ by more than one score for the subsamples whether it be predicted from the Grade XII average or by differential prediction using the individual Grade XII scores. Even in the case of the largest difference between the two coefficients, Engineering students from large high schools who had a large score variability in the criterion as well, the difference in the standard error of measurement using the two coefficients was only 1.73 scores.

The differences between the correlation coefficients in most instances are so small that for operational uses, the slightly better predictions gained by using the more complicated multiple regression technique are offset by the use of more readily calculated prediction from the single high school average predictor.

There remains one question. Are there any differences in the effectiveness of the Grade XII Departmental Averages and the

TABLE V

MULTIPLE CORRELATIONS OF FIVE GRADE XII PRINCIPALS' RATING VARIABLES AND ZERO-ORDER CORRELATIONS OF GRADE XII PRINCIPALS' RATING AVERAGE AND UNIVERSITY FRESHMAN AVERAGE IN FOUR FACULTIES BY SEX AND SIZE OF GRADUATING HIGH SCHOOL

Faculty		Small High Schools			Large High Schools			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Arts	N	61	59	120	76	60	136	137	119	256
	R	.488	.635	.553	.538	.769	.671	.483	.696	.607
	r	.405	.619	.514	.509	.758	.658	.449	.694	.589
Education	N	80	228	308	26	64	90	106	292	398
	R	.556	.607	.579	.578	.653	.631	.521	.607	.584
	r	.479	.515	.516	.438	.612	.578	.435	.536	.522
Engineering	N	59	1	60	42	-	42	101	1	102
	R			.588			.740			.633
	r			.532			.581			.548
Science	N	107	22	129	109	23	132	216	45	261
	R	.693	.671	.671	.788	.926	.814	.698	.800	.713
	r	.652	.633	.650	.785	.928	.813	.728	.819	.746
Total	N	307	310	617	253	147	400	560	457	1,017
	R	.561	.584	.558	.644	.764	.697	.586	.648	.605
	r	.549	.537	.537	.658	.759	.694	.599	.632	.609

TABLE VI
ZERO-ORDER CORRELATIONS BETWEEN UNIVERSITY FRESHMAN AVERAGE AND AVERAGE
GRADE XII DEPARTMENTAL SCORES AND GRADE XII PRINCIPALS' RATING IN FOUR
FACULTIES BY SEX AND SIZE OF GRADUATING HIGH SCHOOL

Faculty	Small High Schools			Large High Schools			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Arts r Dept.Gd. r Prin.Rat	N 61 .398 .405	59 .652 .619	120 .529 .514	76 .649 .509	60 .824 .758	136 .755 .658	137 .534 .449	119 .758 .694	256 .660 .558
Education r Dept.Gd. r Prin.Rat.	N 80 .357 .479	228 .567 .515	308 .522 .516	26 .565 .438	64 .641 .612	90 .632 .578	106 .393 .435	292 .590 .536	398 .553 .522
Engineering r Dept.Gd. r Prin.Rat	N 59	1	60 .609 .532	42	-	42 .730 .581	101	1	102 .661 .548
Science r Dept.Gd. r Prin.Rat	N 107 .623 .652	22 .616 .633	129 .621 .650	109 .795 .785	23 .908 .928	132 .817 .813	216 .727 .728	45 .792 .800	261 .742 .746
Total r Dept.Gd. r Prin.Rat	N 307 .537 .549	310 .580 .537	617 .545 .537	253 .728 .658	147 .791 .759	400 .748 .694	560 .640 .599	457 .683 .632	1,017 .649 .609

Principals' Rating Averages as predictors of University freshman success? The correlations between the two predictors and the criterion are reported in Table VI. No statistically significant differences were found between the two predictors' validity coefficients. Any differences, then, are in terms of numerical value only. As in earlier comparisons, the more objective Departmental-based averages provide larger validity coefficients with some interesting exceptions. The Principals' Ratings-based average was a better predictor of success for males from small high schools than were the Departmental averages except in Engineering. As in the earlier papers in the series, female scores can be predicted with greater accuracy than for males on either predictor.

It can be concluded that the nature of the predictor variables is such that, in terms of the criterion, the method of differential multiple regression holds little advantage for predicting freshman success at the University of Alberta, Edmonton, over use of the Grade XII average alone. Moreover, in a counselling setting in high school, the slight loss in predictive efficiency would be more than compensated for by the ease by which Grade XII averages can be used to predict University Freshman averages (see Mack, 1963, pp. 108). The second general finding was that there was little to choose between the use of Grade XII Departmental score average and the Principals' Rating average in an operational setting. Since the Principals' Ratings are available as much as two and a half months before the end of the school year, effective educational counselling with empirical school grade data is fully practical. Early provisional admission to the University is completely feasible with an estimated overall loss of just over three per cent in predictive efficiency over the present method of admitting students using the Departmental scores which are not available until late July or early August.

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